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USSR Report

TRANSPORTATION

No. 97

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CONTENTS

AIR

MINSK AVIATION REPAIR PLANT MAINTAINS CLOSE TIES WITH SCIENTISTS

Moscow VOZDUSHNYY TRANSPORT in Russian 19 Aug 82 p 3

[Article by N. Inin, Minsk: "Hand in Hand with the Scientists"]

[Text] "Minsk. Aviation Repair Plant No 407 of Civil Aviation" — Every day correspondence arrives at this address from scientific organizations and institutions in Belorussia and other republics. Scientists can be met quite often in the shops of the enterprise. From the problems that they are working on together with production workers you can see that they are not simply guests: all their attention is fixed on the aircraft. When they leave the flight testing station the airliners carry with them certain innovations of scientific-technical progress. The plant and the scientists, who have been working hand in hand for many years now, have a direct part in stepping up this progress.

The aviation repair workers are constantly striving to raise the efficiency of production and energetically introduce the results of scientific testing into practice. The plant engineering service is the nucleus of this important and responsible work. And the collective of the central plant laboratory, headed by L. Shramkov, cooperates most usefully with the scientists.

"Repair technology has always been distinguished by a high level of labor-intensiveness and substantial material expenditures," Shramkov says. "But we try to find efficient ways to improve repair processes. This is not simply a job for one enterprise with a continuous production cycle. But we often find good solutions through our creative contacts with scientists. In this case the tight spots in production become a kind of scientific testing ground. After research and some development the plant receives another technical or technological innovation."

The plant now maintains ties with 25 scientific institutions and organizations. They recently signed a contract on cooperation with the collective of the Riga Institute of Civil Aviation Engineers. Here are a few specific examples that show how efficient cooperation between aviation repair workers and scientists is.

A few years ago plant specialists called on workers in the department of spectral analysis and physical optics at the Belorussian State University. With

their participation a vacuum pump was built and became irreplaceable in performing a number of complex operations. They now have a contract with scientists at the university for cooperation in the field of diagnosing the vibration of ball bearings. A device for quality control of cooling turbines has already been introduced in production. The economic impact of its introduction was about 18,000 rubles. G. Korotkevich, chief of one of the plant laboratories, V. Mikulovich, candidate of technical sciences and university employee, and V. Shnitko, senior scientific associate at the university, are taking active parts in this work.

The most recent ties established by plant workers are with scientists at the Kiev Institute of Civil Aviation Engineers. V. Venediktov, senior scientific associate in the repair department at the Kiev institute, told me the particulars of this.

"Our department and the Minsk workers share common tasks. Judge for yourself. During the production process problems often arise which later become the subject of scientific research. The combination of practical experience and scientific knowledge produces useful results. For example, workers at the plant found uses for the current-vortical flaw detector and the electromagnetic flaw detector to monitor articles made up of ferromagnetic materials. The economic impact received was more than 4,000 rubles. Numerous other valuable developments have been introduced in production.

"The strength of the alliance between scientists at the Kiev Institute of Civil Aviation Engineers and the aviation repair workers is illustrated by the laboratory setup at the plant to test and work out the piloting-navigation complex of the TU-134 aircraft. This laboratory has become one of the links in the chain of production.

"I recall how a pilot friend of mine once compared a modern airliner with a flying factory. That is an accurate comparison! I understand it particularly well now when I have become more familiar with the problems of repair work, where each enormous plane is, so to speak, in the palm of your hand."

The energy supply system on the plane is an independent power plant. But the aviation repair workers work very hard while it is still on the ground so that it will "work" for the flight. At the plant specialists in the production-technological laboratory headed by A. Fedotov are working on the problems of operating and modernizing the centralized energy supply of aircraft. They also attach great importance to the alliance with scientists. For example, the repair workers introduced static stabilized rectifiers with a capacity of 40 kilowatts working together with A. Motornyy and A. Borshchev, teachers at the Kharkov Polytechnic Institute. This improved the quality of the repaired aviation equipment and sharply reduced losses of electricity.

Familiarity with the production base of the enterprise and the people who work there convinces you of the great creative potential of the collective. This finds expression not only in the high quality of work and activities of innovators, but also in the fact that scientific ideas are born and developed right at the enterprise. Thus, laboratory chief A. Fedotov and radio engineer

V. Tsil'ko received an author's certificate for development and introduction of automation of monitoring the electrical wiring of airplanes. This made it possible to reduce repair time significantly, and the economic impact of the innovation exceeds 200,000 rubles.

The plant laboratory of physicomechanical measurements, headed by candidate of technical scientist Z. Buraya, has developed a technological process to restore the wornout surfaces of aircraft parts by the plasma spraying technique.

I was shown a whole assortment of parts with plasma coating at the laboratory of the Belorussian Polytechnic Institute, in the department of metal-cutting lathes and tools. This was no accident. The aviation repair workers continue to streamline their parts repair process. Scientists from the polytechnic institute and the Kiev Institute of Civil Aviation Engineers are actively helping them. They recently concluded a three-party contract for joint investigation and solution to this problem.

"Rationality, economy, and efficiency" — This is the slogan of the plant workers and scientists who are accelerating scientific-technical progress in aviation repair work with emphasis on state interests. Of course, there are also problems whose solutions have dragged on for years. One of them is removing the paint-lacquer coatings from airships. This is a labor-intensive process that involves the use of toxic substances.

"There have been many suggestions and developments to improve this operation, but none has produced the desired result yet," says V. Myts, head of the plant division of mechanization and automation. "Two years ago we concluded a contract with the State Scientific Research Institute of Civil Aviation on joint exploratory work in this area. In our facilities tests were made of a device to remove paint-lacquer coatings using the vortical method. It proved ineffective. Unfortunately, at this point the leading sectorial institute stopped the scientific investigation of the problem."

I found confirmation of this in a letter received recently at the plant.

"After reviewing the results obtained by the plant from experimental work to build a device to remove paint-lacquer coating from the surface of aircraft using the vortical method, and taking your opinion into account, we consider it advisable to stop further work under this contract for the following reasons..."

Of course, reasons have never made the problem go away for anyone. For the aviation repair workers the problem remains; there is an obstacle in their way. And they need serious help here.

Aviation repair enterprises are often called "hospitals" for airplanes. This is entirely fair. They have a large part to play in the precise work of civil aviation. And in close cooperation with science the aircraft "healers" have an even more powerful arsenal at their disposal. The Minsk aviation repair workers are firmly convinced of this.

11,176
CSO: 1829/316

AVIATION COSTS EXAMINED

Moscow GRAZHDANSKAYA AVIATSIYA in Russian No 6, 1981 pp 12-13

[Article by Yu. N. Chudakov, deputy chief of the Main Economic Planning Administration: "The Cost of Aviation Output"]

> [Text] Beginning with this year a new indicator has been approved in civil aviation--the cost of one adduced ton-kilometer. At the editorial borad's request, Yu. N. Chudakov, the deputy chief of the Main Economic Planning Administration, gives an account of the special features of this indicator.

The cost of any output consists of the expenditures for consumed fixed and circulating capital and for wages which are expressed in monetary form and related to a unit of output. In air transport this indicator is at the present time the cost of one ton-kilometer--adduced or operational.

The cost of a single adduced ton-kilometer has been established for the Ministry of Civil Aviation and for its administrations and republic production associations. It is calculated by dividing the total estimated expenditures for transportation aviation and the use of aviation in the economy (PANKH) by the amount of operations ton-kilometers and PANKH ton-kilometers. The PANKH ton-kilometers are determined by means of multiplying flying hours by a conventional coefficient equal to 190 ton-kilometers an hour. The total of the ton-kilometers in transportation work and of the PANKH ton-kilometers comprises the adduced ton-kilometers. All of the expenditure items are included in their entirety in the estimate: fuel and lubricants, depreciation of the aircraft and helicopter pool, current repairs, wages for the entire personnel, social insurance allotments, and airport expenditures. The cost of an adduced ton-kilometer fluctuates depending upon the equations within the range of from 12 to 50 kopecks.

The cost of one operational ton-kilometer has been established for some of the subdivisions which perform transportation work. In determining it, only the following items are included in the expenditures estimate: aircraft fuel and lubricants, depreciation of the aircraft and helicopter pool, current repairs on the aircraft and helicopter pool (all items in full), and also wages for the flying and ground staff, including stewards, allotments for social insurance, and food and uniforms for the flying and ground staff (including stewards).

The cost of one ton of shipments has been established for airport complexes. It includes the following expenditure items (for transportation aviation): wages together with allotments for social insurance and airport expenditures--minus the expenditures included in the cost of one operations ton-kilometer. The cost of one ton of shipments is determined by dividing these expenditures by the total tonnage of the original and transit shipments of passengers, mail, and cargoes. The amount of the cost varies from 60 to 320 rubles for a ton of shipments.

For flying subdivisions which perform PANKH operations the cost of one adduced hour has been established. This indicator has existed for a long time and is not in need of any additional explanation.

For the aviation enterprise as a whole, the "total planned expenditures" indicator has been established. Why has this been done?

Proceeding from what has been said above, an aviation enterprise, depending upon its structure, can have three cost types or parts: an operations ton-kilometer, a ton of shipments, and an adduced hour. Let us assume that the indicator "the cost of one adduced ton-kilometer" has been established for such an enterprise and that on this basis the corresponding cost indicators have been determined for its component subdivisions. There exists between the absolute values of the costs a clear interconnection which is based on the structure of the operation volumes. Any, even the most negligible, change solely in the structure of the operations volume is reflected in one way or another on the enterprise's costs as a whole and sometimes leads to at first sight completely surprising results.

The following, for example, case is entirely possible. Let us assume that during the reporting period all three of an enterprise's subdivisions have decreased the cost of operations established for them in the plan. But in the enterprise as a whole the cost of an adduced ton-kilometer increased compared to the plan. This would occur if there is a substantial increase in above-plan operations volume for PANKH where the cost of an adduced ton-kilometer is almost four times greater than the analogous indicator for transportation aviation. And it turns out that each subdivision has fulfilled its planning assignment for cost, while the enterprise has not. The opposite variant is not excluded either (see Table 1).

TABLE 1

Operations Volume		Cost of Operations		Total Expenditures, Millions of Rubles		
Planned	Actual	Planned	Actual	Planned	Actual	Recalculated Planned
200 millions of ton-kilometers	200 millions of ton-kilometers	12 kopecks ton-kilometer	11.8 kopecs/ton-kilometer	24	23.6	24
300 thousands of adduced hours	353 thousands of adduced hours	90 rubles/ hour	89 rubles/ hour	27	31.4	31.8
100 thousands of tons	100 thousands of tons	60 rubles/ tons	59 rubles/ tons	6	5.9	6.0
257 millions of adduced ton-kilometers	267 millions of adduced ton-kilometers	22.18 kopecks/ton-kilometer	22.81 kopecks/ ton-kilometer	57	60.9	61.8

TABLE 2

Expenditure Components	Proportion of Items in Total Cost of Ton-Kilometer, in Percent	
	In Prices Until 1 Jan 82	In Prices From 1 Jan 82
Aircraft fuel and lubricants	19.1	24.8
Depreciation on aircraft and helicopter pool	28.2	25.6
Current repairs	3.7	3.1
Wages of entire personnel	25.5	23.1
Allotments for social insurance	1.8	3.6
Airport expenditures	21.7	19.8
Total	100	100

In order to prevent such illogical situations the indicator "Total Planned Expenditures" has been introduced for a united enterprise. An evaluation of plan fulfillments for this indicator is performed by comparing actual expenditures against planned expenditures recalculated for the actual volume of operations and the planned cost of a single operations ton-kilometer, adduced hour, and a single ton of shipments. The plan for the indicator "Total Planned Expenditures" is regarded as fulfilled if the actual amount of expenditures in the enterprise as a whole is equal to the recalculated planned amount of expenditures or lower than it.

We shall clarify the recalculation of the planned amounts of expenditures and the evaluation of an enterprise's work with regard to the fulfillment of planned expenditures with an example. In the table, the actual operational volumes of the enterprise's subdivisions are recalculated for the planned cost of operations.

Let us compare the actual amount of expenditures--60.9 million rubles--with the recalculated planned amount--61.8 million rubles, and determine the enterprise's fulfillment of the plan for this indicator. In our example the percentage of actual expenditures compared with the planned amount is 98.5 percent. This is precisely the case in which, despite the fulfillment of the cost plan by each subdivision, the enterprise as a whole did not fulfill the planned assignment for the given indicator.

In considering the cost of aviation operations, it has to be noted that the establishment of a new indicator for them coincided in time with a review of industrial wholesale prices, thermal and electric energy fees, and also with the introduction of new social insurance allotment rates. This is not accidental. Prices are one of the important levers in the economic mechanism. It would be difficult to overestimate their importance under present conditions for the creation of cost accounting conditions for the work of our aviation enterprises. The wholesale prices which were in effect until recently had not been reviewed for most types of output for many years and, of course, were in many respects obsolete. During the past production costs decreased in some branches as a result of technical progress, for example, in electronics, while in others, on the contrary, for a number of reasons they increased. This applies first of all to the fuel and energy and raw materials branches where it is becoming more difficult to obtain petroleum, gas, and other minerals in the developed areas, and in which a shift is occurring to the country's East and North. These circumstances plus increases in wages and environmental protection expenditures demanded the introduction of changes in the price system. The change in wholesale prices for 1982 is characterized in civil aviation by a more than 10 percent increase in the total expenditures estimate and, consequently, in the cost of one adduced ton-kilometer. The basic increase in expenditures is accounted for by aviation fuel and lubricants--43 percent. A small decrease--19.2 percent--has occurred for current repairs. Allotments for social insurance doubled, and airport expenditures increased by 0.6 percent. For the "wage" and "depreciation of the aircraft and helicopter pool" everything has remained as before.

With the introduction beginning in 1982 of the new wholesale prices, fees, and social insurance allotments the cost structure of an adduced ton-kilometer has been changing somewhat and has the following appearance (see Table 2).

What, first of all, has to be noticed? First, a substantial increase in the proportion of expenditures for the "aviation fuel and lubricants" item has occurred in the cost of aviation operations. Today one-fourth of the expenditures in the branch are expenditures for aviation fuel. Hence, the importance of measures to economize it grows enormously. Every percentage of an absolute economy of fuel is more than a million rubles of state monies. In evaluating the work which has begun recently to increase the efficiency of the use of aviation fuel it has to be emphasized that last year alone almost 20 million rubles worth of it (in prices of 1 Jan 82) was economized in Aeroflot. This has had a positive effect upon the branch's financial results.

Further, although the proportion of expenditures for the depreciation of aircraft, helicopters, and aircraft engines has decreased somewhat, it has continued to remain high--25.6 percent. This means that the writing off of unnecessary and obsolete physical assets--the aircraft engines--can also produce quite good results. Incidentally, every year engines account for one-tenth of their original cost which are classed as direct operational expenditures of civil aviation.

The proportion of the remaining items of the expenditures estimate has not undergone any sharp change as a result of the new wholesale prices. The way to reduce the cost of aviation operations in these items is generally known.

It should be noted that with the new prices the traditional chief direction of reducing the cost of aviation operations--a constant improvement of the use of the aircraft and helicopter pool with respect to flight time and flight productivity--is taking on especial importance.

2959
CSO: 1829/258

MOTOR VEHICLE

RULES FOR TRANSPORTING HAZARDOUS MATERIALS

Moscow AVTOMOBIL'NYY TRANSPORT in Russian No 6, Jun 81 pp 51-54

[Article by L. Kochetov, candidate of engineering sciences, and V. Reznikov, engineer, VNIIBD MVD [All-Union Scientific Research Institute for Highway Traffic Safety of the Ministry of Internal Affairs]]

[Text] In recent years there has been a considerable increase throughout the world in the highway traffic of explosives, inflammable, toxic and other hazardous materials. The principal types of danger arising in the shipment of these materials are the following: the threat of fire and explosion, poisoning with toxic substances, infections and radiation injury.

As evidenced by articles published in the press, highway traffic accidents and other incidents have been giving rise to the hazards indicated above more and more frequently. The principal causes of the incidents are these: defectiveness of national rules governing the transportation of hazardous goods, inadequate surveillance over their enforcement, the lack of uniformity in classification and the list of hazardous goods, and also the rules of operation of the different branches of transportation.

Taking into account this situation and the need to standardize the national rules, the committee of experts for the transportation of hazardous materials of the UN Economic and Social Council and its subordinate entities have drafted a classification and definition of classes of hazardous goods, have compiled a list of the hazardous goods carried most frequently and have assigned each of them a UN number and have worked out uniform requirements concerning labeling, installation and other operations involved in the shipment of goods.

On the basis of these recommendations the European Agreement on International Highway Transportation of Hazardous Materials (DOPOG) was at one point drafted on the basis of these recommendations, and many countries in Europe later joined it.

The following are in effect in our country: "Rules for Maritime Shipment of Hazardous Cargo," "Rules for Air Shipment of Hazardous Cargo," "Temporary Rules for River Transportation of Hazardous Cargo." Rail transportation of hazardous freight is regulated by the general "Rules for Transporting Freight," in which Sections 29 and 30 are devoted to the carrying of hazardous goods.

There are no uniform rules governing the highway transportation of hazardous materials. These shipments are made on the basis of a whole series of instructions and rules on carrying specific hazardous materials which have been drafted by individual ministries or manufacturers of the materials.

In order to fill these gaps and mainly to guarantee safety of other motorists and the public in connection with the transportation of hazardous materials, VNIIBD MVD SSSR [All-Union Scientific Research Institute for Highway Traffic Safety of the USSR Ministry of Internal Affairs] has drafted the "Instruction on Procedure for Highway Transportation of Hazardous Materials," which was approved by order of the USSR Ministry of Internal Affairs on 20 November 1980 and took effect on 1 March 1981.* The instruction is binding on all enterprises, organizations and institutions carrying hazardous materials and also on enterprises, organizations and institutions figuring as shippers and consignees of such goods, with the exception of transportation of substances and articles for military purpose, which are transported in accordance with specific rules and instructions.

The instruction takes into account the normative documents in effect in the USSR which concern the transport of hazardous freight, the individual recommendations of the committee of experts for carrying hazardous materials of the UN Economic and Social Council and the European Agreement on International Highway Transportation of Hazardous Goods (DOPOG).

The instruction consists of seven sections and covers a wide range of topics pertaining to safeguarding traffic safety in connection with these shipments. It sets forth the procedure for carrying hazardous freight on public roads regardless of their departmental jurisdiction over the entire territory of the USSR and defines the principal requirements governing the organization, technical adequacy and safety of the shipments.

The instruction gives a classification of hazardous materials in conformity with GOST [State Standard] 19433-74 "Hazardous Goods. Classification and Danger Signs." Class 1--explosives; 2--gases, compressed, liquefied and dissolved under pressure; 3--inflammable liquids; 4--inflammable substances and materials; 5--oxidizing substances and organic peroxides; 6--poisonous and infectious substances; 7--radioactive substances; 8--caustic and corrosive substances; 9--substances with relatively low hazard during shipment.

Only the shipment of substances in Class 9 and cases of shipment of a minimum safe weight of a hazardous substance or minimum safe quantity of hazardous articles (with the exception of explosives and highly toxic substances and articles) are not covered by the requirements of the instruction.

The minimum safe weight of a hazardous substance or minimum safe quantity of hazardous articles in a single vehicle whose transport can be regarded as the shipment of a nonhazardous material is determined by the manufacturer and is indicated in the rules or technical specifications for shipment of the given

* The "Instruction on Procedure for Highway Transportation of Hazardous Materials" has been sent to all ministries and departments carrying hazardous materials.

type of material. The fuel in the tank of a motor vehicle can be taken as an example of minimum safe amount of a hazardous substance.

The instruction sets forth the procedure for carrying hazardous materials, and the basis for shipments are the rules or technical specifications for transport which are compiled for the particular piece of freight or group of freight close in its characteristics (petroleum products, radioactive substances, infectious substances, and so on). These rules or technical specifications must be compiled by manufacturers of goods on the grounds that they will contain information known only to the manufacturer (technical name of the substance and its class and subclass, physical properties, minimum safe weight or minimum safe quantity, and so on). But trucking organizations may also be enlisted to draft certain sections of the rules (requirements which must be met by transportation equipment, by drivers, and so on).

A separate section sets forth the additional requirements concerning the equipment and gear of transportation equipment intended for carrying hazardous materials.

Motor vehicles regularly used to carry hazardous materials in Classes 1-5 must have the exhaust pipe and muffler placed on the radiator side with the exhaust opening turned down. If trucks are used for occasional shipments of these materials, it is sufficient to install a spark arresting screen on the exhaust pipe.

If possible the fuel tank is removed further from the engine, exhaust pipe and electrical conductors. It is protected by a cover on the bottom and sides.

Electrical circuits must contain safety fuses or automatic circuit breakers as well as devices so that the driver can disconnect the battery from the cab; all electric lamps used for lighting, which are to be recessed within the body, must be covered with a strong mesh or grating.

Transportation equipment must have a metal grounding chain with a ground contact 200 mm long and a grounding peg with cable (to protect against static electricity while parked). The instruction of VNIIBD MVD SSSR also provides additional requirements which must be met by bodies. It contains a list of tools, fire extinguishers, personal safety equipment, signal devices, and so on, with which every vehicle designated for carrying hazardous materials must be outfitted.

In cases when the technical condition of the vehicle intended for carrying hazardous materials meets the instruction of the manufacturing plant and the "Highway Traffic Rules," and the equipment, gear and markings meet the requirements of the instruction and the rules or technical specifications for carrying the specific type of hazardous material, Gosavtoinspektsiya [State Motor Vehicle Inspectorate] shall issue a certificate permitting it to carry hazardous materials. The transportation of hazardous materials is not allowed without such a certificate.

Permits to drive vehicles carrying hazardous materials are issued to drivers who have been driving continuously for at least 3 years, whose chauffeur's license covers the relevant category of vehicle and who have had special training or instruction and medical screening. In addition, they must have a certificate permitting them to carry hazardous materials. These certificates are issued by trucking enterprises and trucking subdivisions of industrial enterprises after the drivers go through specialized training or instruction. The special training of drivers permanently employed in carrying hazardous materials should in our opinion include the following: study of the hazardous properties of the materials being carried; study of the system governing information concerning the hazard (the marking of vehicles and containers); drills in case of DTP [highway accident], fire, leakage of the material, and so on; training in the methods of first medical aid to casualties should incidents occur; instruction in reporting an incident that has occurred to the proper officials, and other subject matter.

Aside from the duties indicated in the "Highway Traffic Rules," the driver of a vehicle carrying hazardous materials is subject to a number of additional obligations. He must strictly follow the route for the shipment which has been established and cleared with Gosavtoinspektsiya, stop to park only at the places indicated, and not exceed the prescribed speed.

Should he be forced to stop because of damage to a container containing an especially hazardous material, and should there be a hazard to other motorists, the driver must mark the place where he has stopped with two signs saying "Traffic Prohibited."

In case of a DTP, in addition to the actions indicated in the "Highway Traffic Rules," the driver is required to take steps for primary repair of the damage of the DTP in accordance with the prescription set forth in the emergency card he carries with him; mark the place of the DTP with two signs saying "Traffic Prohibited" (should he be carrying particularly hazardous materials); if possible, prevent bystanders from approaching the scene of the DTP; and upon arrival on the scene of the DTP of representatives of law enforcement agencies and other officials to inform them about the hazard and the steps taken and to present documents covering the material being carried.

The driver is strictly forbidden to accelerate the vehicle rapidly after stopping, to pass vehicles traveling at more than 30 km/hr, to apply the brakes suddenly, to travel with the clutch, transmission and engine disengaged, to smoke while traveling, to make a fire near his vehicle, or to leave the vehicle except in a case of extreme necessity.

The instruction also defines the procedure for selection and clearance of the route for shipment of hazardous materials.

The shipment route is chosen by the trucking enterprise or trucking subdivision of the industrial enterprise carrying the hazardous materials. If possible, the shipment route must not pass through settlements, near industrial facilities, through recreation zones, suburban parks, near architectural monuments, entertainment facilities, institutions for culture and adult education,

educational institutions, preschool institutions and medical institutions. Stopping places, refueling points and dangerous sections of roads shall be indicated on the shipment route (the latter are to be indicated by Gosavtoinspektsiya, with which the shipment route is cleared).

The shipment route is cleared with Gosavtoinspektsiya for the jurisdiction it covers. For this purpose the rules for technical specifications for carrying the given type of hazardous material (duly cleared), the permit allowing the vehicle to carry the hazardous material, and the shipment route are submitted at least 10 days before shipment begins.

The allowed speed is established by Gosavtoinspektsiya when it clears the shipment route in accordance with the rules or technical specifications for carrying the particular type of hazardous material. Should the vehicle's speed be restricted, a sign to that effect shall be displayed.

When especially hazardous materials are carried in convoy, provision is made for it to be accompanied by an escort vehicle furnished by the organization responsible for carrying the freight, and in special cases by a patrol vehicle of Gosavtoinspektsiya. The procedure for the movement of the escort vehicle is indicated by Gosavtoinspektsiya on the basis of traffic conditions along the shipment route. The headlights shall be lighted and dimmed in the daytime on escort vehicles and vehicles carrying hazardous materials.

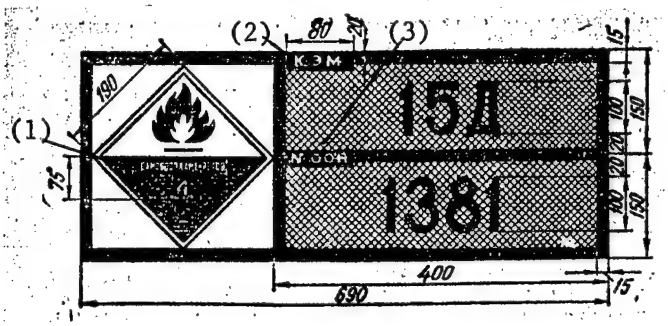
If a convoy consists of five or more vehicles, it must include a spare vehicle equipped to carry the particular type of material.

There is a specific section of the instruction which sets forth the contents and procedure of the SIO [system governing information concerning a hazard]. It should be noted that the SIO is being put into effect for the first time in carrying shipments of hazardous materials in our country.

The elements of the SIO include the following: the notification board (sign) to mark the vehicle; an emergency card defining the measures to correct the consequences of incidents; the special color of paint and markings on the vehicle.

The notification board contains the danger sign of the particular hazard, the code indication of the emergency measures and the code number of the substance in the UN list. Its purpose is to alert motorists and highway traffic inspectors that hazardous materials are being carried by the vehicle, to determine the actions taken by police, firemen and other officials who are first to arrive at the scene of an incident (in accordance with the indicated code number of emergency measures). The code number of the substance in the UN list is intended for specialized teams for complete repair of the consequences of the incident.

The notification boards shall as a rule be made by the consignees of hazardous materials and shall be delivered to trucking enterprises for installation on the vehicles.



Notification sign to mark the vehicle.

Key: 1. Combustible 2. KEM 3. UN number

The format of the notification board is shown in the figure. The field of the left part of the sign must be white, and the right side orange.

The KEM [Emergency Measures Code], the UN number (number of the substance in the list of the UN Organization) and the writing in the danger sign "Caustic substance 8" are done in white. The border of the sign, dividing lines, the emergency measures code, the code number of the substance on the UN list and writing on other danger signs are to be done in black. The border of the danger sign is to be done in black at a distance of 5 mm from the shoulder of the character and shall represent a line at least 5 mm thick. The thickness of the numbers and letters making up the emergency measures code and the code number of the substance on the UN list shall be at least 15 mm, and in the danger sign at least 3 mm.

The emergency measures code may consist only of numbers, or only of letters, or of numbers and letters. If the emergency measures code is written in both letters and numbers, the numbers shall come first and then the letters.

The emergency measures code shall use numbers concerning fire and leakage and also information on the degree of the hazard should the substance reach sewage or bodies of water. Code No 1 signifies "Do not use water. Use dry extinguishing substances," 2 "Use a stream of water," 3 "Use water spray," 4 "Use foam or compositions based on (khladony)," 5 "Prevent substances from entering sewage and bodies of water."

The letters are used in emergency measures codes in connection with protection of human beings: D--"Breathing apparatus and protective gloves required," P--"Breathing apparatus and protective gloves required only in case of fire," K--"Complete safety suit and breathing apparatus required," E--"Evacuation required."

The emergency card is filled out by the enterprise manufacturing the hazardous material to conform to a standard format. It must be carried by the driver of the vehicle carrying hazardous materials or the driver of the escort vehicle. Should the hazardous material be escorted by a representative of the shipper (consignee) the emergency card may be in his possession.

The appendices to the instruction furnish the following: a sample list of the information which the rules or technical specifications for carrying a particular hazardous material must contain; the forms of certificates permitting the vehicle and the driver to carry hazardous materials; the format of the shipment route; the format of the notification board, the format of the emergency card; the format of the information card furnished to law enforcement agencies.

Ministries and departments concerned with the production and transport of hazardous materials by highway should make known to subordinate organizations and enterprises those principles of the instruction which concern their activity, and should organize the revision of the rules and technical conditions in effect for carrying specific types of hazardous materials in conformity with the instruction.

7045
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INCREASED LABOR PRODUCTIVITY URGED IN WESTERN SIBERIAN ROAD BUILDING

Moscow AVTOMOBIL'NYYE DOROGI in Russian No 7, Jul 82 pp 4-5

[Article by Ye. I. Bronitskiy, chief engineer in the Main Administration for Road Construction in Western Siberia: "Increased Labor Productivity Is the Guarantee of Success"]

[Text] Improving our country's fuel balance is a paramount task of economic and political significane in the 11th Five-Year Plan. It is well known that recovery of oil and gas in Western Siberia plays a large role in this problem. To a definite extent, the success of this task depends on solving the transportation problem, where construction of motor vehicle roads is of no small importance.

During 1981-1985, the Ministry of Transport Construction and the sub-contracting road building organizations which will work with the ministry in the union republics must build and put into operation a considerable number of highways and intra-industry motor vehicle roads to the oil and gas fields in Tyumen and Tomsk Oblasts.

Considerable numbers of various machines and motor vehicles are being used to build the roads, as is a large group of workers whose augmentation in connection with increased construction in uninhabited and sparsely populated areas of Western Siberia presents definite difficulties. That is why we are paying close attention to improving the production processes and other technical and organizational measures which are directed, in the first place, to increasing the productivity of labor at construction sites in areas where oil and gas are being recovered. Without a solution to these tasks, it is inconceivable that the roads will be successfully put into operation as planned.

However, despite this fact, the requirement established for 1981 regarding increased labor productivity was not fulfilled by the Zapsibdorstroy [West Siberian Road Building] Industrial Association, which builds roads in Western Siberia. The basic causes of the non-fulfillment of the requirement were not only a failure to reduce losses, but also a certain increase in non-productive losses of work-time and increased idleness of construction machinery and equipment in certain construction subunits. In particular, this was connected to the non-fulfillment of the building and installation

work plan for a number of conjunctive conditions, as well as non-fulfillment of plans for introducing new equipment and advanced experience (organization of labor) and non-fulfillment of organizational and technical measures to increase labor productivity.

Thus, the Nizhnevartovskdorstroy [Nizhnevartovsk Road Building] Trust in 1981 failed to fulfill, by more than 22,000 man-days, its organizational and technical measures for reducing labor losses. For the main administration as a whole, the overall level of fulfillment of the measures for reducing labor losses was only 35 percent.

In the 11th Five-Year Plan, the task being planned for the trusts which are part of the Zapsibdorstroy Industrial Association is to increase labor productivity by 19.1 percent, while reducing labor expenditures by 890,000 man-days. This is to be accomplished by increasing the level of pre-fabrication and use of new structures by 19 percent; increasing the degree of mechanization by 25 percent; improving the use of machinery, equipment and gear by 23 percent; increasing the introduction of new production processes and progressive work procedures by 17 percent; improving the organization of production, the introduction of a brigade contract and advanced labor methods, as well as introducing various proposals for reducing the amounts of manual labor by 16 percent. From these data it follows that the basic directions for reducing labor expenditures, while constructing motor vehicle roads in the areas under consideration, are such factors as increasing the level of mechanization, together with better use of machinery, equipment and motor vehicles, plus a further increase in the volume of work done to construct pre-fabricated road surfaces and introduce advanced production processes.

During recent years, the trusts which are part of the Zapsibdorstroy Association have been supplemented significantly with highly-productive road building machines and trucks with large load capacities. In 1982, the construction subunits of these trusts have been better equipped with pneumatic-tired, 16-ton capacity cranes, DZ-98 heavy-duty graders and high-power bulldozers with mounted roadplows which allow the bulldozers to loosen frozen earth, thus avoiding the use of blasting. From year to year, the amout of work increases which can be executed by efficient hydraulic excavation when sandy soils are washed into piles near the construction route. Use of hydraulic excavation enables a considerable reduction in transport movements during construction of road bed embankments.

Undoubtedly, the factors enumerated above will help not only to increase the pace of construction, but also to carry out construction with fewer workers. We must use all the highly-productive machinery to attain good results while striving to assure that all equipment operates with maximum effectiveness. Therefore, we must do our utmost to attain a further decrease in machine idleness, an increase in output and use of shiftwork. An example of such use of earthmovers is the experience of the progressive mechanized columns of the Uralstroymekhanizatsiya [Ural Construction Mechanization] Trust which are working in analagous conditions. The essence

of this experience lies in precise planning of operations, thorough engineering and technical preparation of sites, extensive application of special collective efforts as well as large-scale mass socialist competition to attain the highest output for natural indices.

For a further increase in labor productivity, it is extremely important that labor expenditures be reduced in subsidiary and auxiliary production, where the proportion of manual labor is now greater than 50 percent. Special measures for creating a production base, with possible mechanization of production processes, were developed by the Glavzapsibdorstroy [Main Administration for Road Building in Western Siberia]. In particular, construction of sidings for the construction organization will be continued, with completely mechanized handling of loads. The increase in labor productivity, attained by introducing new production processes, provides for further improvement of technical processes for building roadbeds during the winter, without removing peat, by using peat in the lower part of the embankment and expanding the use of synthetic non-fabric materials. It is planned to use these synthetic materials in the roadbed as dividing, filtering, reinforcing and drainage layers, as well as in designs for road pavements and to reinforce slopes. Textile layers at the base of an embankment make it possible to build embankments on marshes and help speed up the work and improve the quality of work. Such layers also eliminate seasonal interruptions in excavation work and significantly reduce the amount of soil transported by motor vehicles. Textile layers are also used instead of foundations consisting of a sand-gravel mixture and an installation layer, instead of foundations consisting of a dry sand-cement mixture, and are also used under junctions of a cement and concrete slab road surface.

Using synthetic textile materials provides an overall reduction in labor expenditures of about 600 man-days for each kilometer of road.

It is proposed to use dry mixtures of cement and soil, prepared in a stable negative temperature, when laying foundations under prefabricated surfaces. This makes it possible to better utilize many types of skilled workers during the winter, as well as road building machinery and trucks. The process for laying prefabricated road surfaces will be improved, including such labor-intensive work as laying junctions. A great deal of attention will be paid to introducing and improving the work crew contract, as one of the important factors in increased labor productivity. The amount of work performed by the crew contract method will total more than 50 percent by the end of the 11th Five-Year Plan. The through-train crew contract will be further developed. It is planned that subsidiary and service personnel will be included in self-financing relationships, as a result of which realistic prerequisites will be established for a more effective utilization of this progressive form of labor organization.

Having examined, in March 1982, the question of increasing the organizing role and responsibility of the main administrations for assuring that their subordinate organizations fulfill the annual tasks and the tasks prescribed in the 11th Five-Year Plan for increasing labor productivity, the Ministry

of Transport Construction took note of the essential shortcomings in this work and committed the managers of the main administrations, trust, organizations and enterprises to assure that the below-listed actions be accomplished.

1. Develop and implement specific measures for introducing advanced and highly productive labor methods in each subunit; regularly study advanced labor methods; conduct competitions in workers' skilled trades, special-purpose seminars to study progressive production methods and advanced experience.

2. Each month, review the status of fulfilling the tasks for increasing labor productivity and plans for organizational and technical measures in each subordinate organization, taking specific operational measures to eliminate the shortcomings which come to light.

3. Systematically analyze the causes of work-time losses; strictly observe production and labor discipline; develop and implement specific measures to regulate the workers' labor and rest procedures, to improve public utilities and social services at work positions.

4. Activate the fulfillment of organizational and technical measures by the immediate executors through discussion at expanded production conferences in sections, construction administrations and trusts, with all-round encouragement of workers, mechanization specialists and foremen seeking a significant increase in labor productivity, etc.

Implementing the Ministry of Transport Construction's instructions directed at fulfilling the tasks for increased labor productivity, is an especially important task for the managers of all construction subunits.

This task is even more important when building roads in Western Siberia.

The Glauzapsibdorstroy is attentively examining the organizational and technical measures of the trusts in the Zapsibdorstroy Association, with the goal of clearly defining these measures and considering all factors which determine the attainment of the prescribed amount of increase in labor productivity. The successful growth of labor productivity can only be guaranteed by the Main Administration and the Zapsibdorstroy Association constantly monitoring the execution of these measures and by the active, creative attitude of engineering personnel in all construction subunits toward introducing advanced work methods, toward struggling against losses of work time.

Photo caption: Laying a road surface of reinforced concrete slabs

9887
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REGRIGERATOR CARS TO HELP WITH FOOD SUPPLY PROGRAM

Moscow GUDOK in Russian 24 Jul 82 p 2

[Article by A. Leont'yev, chief of the Perishable Cargo Transport Division in the Main Administration of Traffic of the Ministry of Railways, "Refrigerator Through-Trains: Advantages and Prospects. The Food-Supply Program Is Our Common Cause"]

[Text] Moscow--Railroad transport of foodstuffs such as meat, fish, vegetables, fruits, canned goods and other perishibles will increase by the end of the 5-year plan by approximately 18 to 20 percent. For this purpose, thousands of new refrigerator cars will be supplied. Yet a large part of the increase will have to be attained by making better use of the pool of insulated cars.

Advanced groups of workers are searching for resources to make more efficient use of insulated cars. Thus, in the Central Asian and Azerbaijan railroads, widespread use is being made of the method of loading packaged vegetables in a solid pile 2.4 meters high, as opposed to 1.6 meters as prescribed by the regulations. This enabled tens of thousands of cars to be freed for additional loading.

In attempting to reduce empty runs by refrigerator cars, the workers at a number of stations on the Moscow Main Line began filling the cars which were enroute to their next destination with fruits, vegetables and other freight.

The initiative of the Ussuriysk Refrigerator Car Depot deserves special attention. The depot's management, party and trade union organizations assumed the task of transporting all perishible goods being shipped from the Far East to the European part of the country and Central Asian areas and back to the Far East, only on trains and blocks of cars assigned to their depot. At first, there was one goal: to regulate the work and time-off procedures for refrigerator car crews, so that they would be relieved on their own railroad. This would considerably reduce losses of time and money when crews are relieved. Everyone understands that it is much cheaper and quicker to relieve a crew near the depot, rather than somewhere in the central areas of the country.

The shipping railroads were instructed to fill, as much as possible, the insulated cars which were assigned to the Ussuriysk Depot with goods bound for railroads in the Urals and Siberia. Some people looked for and found the possibility of doing this while others did not look for it and consequently did not find it. That is why this undertaking did not have the expected effect at first.

But the game was obviously worth the candle. Thus, last year the workers at the depot, with the aid of the Ministry of Railways, carefully studied the freight traffic in food products from the Far East to the central areas of the country and back. They studied both fulfilled and long-range planned freight traffic. They determined that 80 percent of all the fish and fish products from Far East ports go westward--beyond the Urals or to Central Asian areas. So, such goods can be shipped on through-trains made up of refrigerator trains and blocks of cars of the Ussuriysk Depot.

But how were these trains and blocks of cars to be returned to Ussuriysk? An analysis of perishible freight traffic from the European port of the country and Central Asia to the railroads of Eastern Siberian and the Far East showed that, during certain periods, it is entirely possible to ship the perishable goods from these areas on through-trains. In particular, from May through October the Central Asian Railroad could fully provide through-train shipments of fruits and vegetables to the East Siberian, Transbaykal and Far Eastern railroads. But, starting with October, perishibles are shipped, on the same scale, to the east from European ports, western border stations, as well as from Moldavia and the railroads in the Caucasus.

Thus, one can organize, in theory, the transport of perishibles from the Far East to the central part of the country and back, using shuttle trains made up of refrigerator car sections assigned to the Ussuriysk Depot. But how can this be done in actual practice?

It must be noted that the workers at the depot had to do a great deal of organizational work. First and foremost, a staff to organize through-train routing was set up, headed by A. Borovik, the chief of the depot. Representatives from the depot were sent to the Lvov, Odessa, Moldavian and Central Asian railroads to make operational decisions about organizing transport of perishables by through-trains for the Far East. They kept track of concentrations of refrigerator cars from Ussuriysk at large loading points and kept in constant contact with the consigners.

The representatives from Ussuriysk designated these through-trains as rail network production trains. Each of the trains consists of 7 or 8 sections, 5 cars per section, and is an independent entity in an operational sense. The crews servicing the sections are united in a single collective. They appoint a through-train chief, a political activities organizer and a trade union organizer.

The first such train was organized in May 1981. from car sections loaded with early cabbage, at Shurchi Station on the Central Asian Railroad. The train went more than 7,000 km without being broken up. These car sections came back to the Moscow railroad loaded with fish from the stations at Rybniki and Mys Churkin. Then they were sent to Vadul-Siret Station on the Lvov railroad where they were filled with goods bound for the Far Eastern Railroad.

Thus, by 10 May, more than 110 through-trains had been dispatched. From the Odessa Railroad, 14 through-trains were dispatched; from the Lvov Railroad the number was 25; 4 were sent from the Moldavian and 67 from the Far Eastern railroads. Their average travel distance without being broken up was 8,200 km. Certain trains went as much as 10,000 km from the loading station to the break-up station. The average distance covered in a day by the car sections was 668 km, which exceeded the norms for refrigerator cars by 168 km.

When the traffic is organized in this manner, the safe-keeping of goods in transit improves considerably and instances of reloading, due to the failure of power traction equipment, are eliminated. All malfunctions are corrected by the crews themselves, who have joined the through-train.

It became possible to regulate the work and time-off procedures for the maintenance crews since they were relieved in a timely manner in areas near the depot where cars were assigned. Expenditures were considerably curtailed by reducing the crew-shifts in the western areas of the country. Safety devices, labor protection procedures and fire safety were improved.

Now everything is ready to considerably increase the number of shuttle production through-trains made up of refrigerator car secions assigned to the Ussuriysk Depot. We must also study the possibility of using this method to operate car sections assigned to depots in the Urals and Siberia.

9887
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RAILROAD

EDITORIAL ON NEED FOR EFFICIENT TRANSPORT OF FOOD

Riga SOVETSKAYA LATVIYA in Russian 6 Aug 82 p 1

[Editorial: "Give the 'Green Light' to Goods from the Country!"]

[Text] The editors of our newspaper still frequently receive alarming reports about grain being spilled on a railway roadbed, about vegetable rotting because of a lengthy delay while in transit, about other shortcomings in transporting agricultural goods. And we can understand our readers' feelings: you can't remain indifferent when you see that corn, vegetables and potatoes, which it took a great deal of work to grow, are not delivered from the fields without losses.

It was no accident that Comrade L. I. Brezhnev emphasized in his report at the May (1982) Plenum of the CPSU Central Committee that the party's course for an effective resolution of food-supply tasks requires an accelerated development of the branches of the economy which are linked to agriculture. He also emphasized that more and more frequently, it is not production which is the bottleneck; rather it is the safe-keeping, processing and transporting of the agricultural products to the consumer. That is why transportation, an important link in the nation's agro-industrial complex, has a large role in carrying out the tasks of the Food-Supply Program.

The Latvian transport workers understand this well and are doing a great deal to assure that goods for the country get the "green light." Thus, a comprehensive program of measures to promote the better execution of the Food-Supply Program is being developed on the Baltic Railroad. In recent years, the railroad workers have done a great deal of work to develop the track facilities; they have improved the technical level of equipment at stations; they have supplemented the freight car pool with special rolling stock for transporting grain, fertilizers and perishable goods. The railroad and motor vehicle transport workers are successfully introducing progressive transport methods which reduce losses during deliveries of agricultural products.

Also, the republic's transport workers have a number of unused reserves. The traffic speed for cars with fruits and vegetables is still low on the railroad; empty cars are not being provided for loading in a timely manner and are not always being provided in the agreed-upon quantities. During the first 6 months of 1982, the divisions of Baltic Railroad did not fulfill the plan for transporting balanced fodder, chemical and mineral fertilizers.

Freight car facilities workers are not increasing satisfactorily the degree of mechanization at technical inspection points for cars and are allowing violations of the prescribed production process. This often leads to delays in dispatching trains, to occurrences of technical malfunctions enroute and freight losses.

The managers and party organizations of rail enterprises are faced with the task of eliminating such shortcomings as quickly as possible and creating in each collective an atmosphere of great responsibility for the safekeeping and timely delivery of agricultural goods.

Motor vehicle transport workers have been called upon to provide a great deal of help to the rural laborers. The transport workers must develop the most efficient routes for delivering goods and must eliminate instances of unnecessary transport of agricultural products. The closest attention must be paid to developing direct lines of communication from kolkhozes and sovkhozes to food-processing and commercial enterprises. Attention must also be paid to expanding the acceptance of agricultural products right at the places where they are produced, with the purchasing agents' transportation equipment hauling the products away.

Workers in departmental transport, belonging to various enterprises and organizations, are taking an ever more active part in transporting agricultural goods, together with general-purpose motor vehicle transport drivers and Goskomsel'khoztekhnika [State Committee for Supply of Production Equipment for Agriculture] drivers. Central dispatcher services, coordinating the work of departmental motor vehicles, have been set up in eleven rayons in the republic. In a number of rayons, departmental transportation resources can make an important contribution to agricultural transport.

In motor vehicle transport operations, a great deal depends on the condition of the roads. The road network is very well developed in our republic. But not all the roads meet the requirements. Transport movements are hampered on some roads, particularly intra-farm roads, during unfavorable weather conditions. The managers of the Ministry of Agriculture must devote greater attention to building and maintaining these roads.

Precise organization of loading and unloading operations for transportation resources has no less significance. There is still too much time being spent for such operations; freight cars and trucks frequently stand idle in excess of the norm on spur tracks. Managers and party organizations in enterprises subordinate to the ministries of Procurement, Agriculture, Meat and Dairy Industry, and Fruit and Vegetable Industry must take all necessary actions to reduce transport idleness in excess of the norm.

Elimination of losses and delays during deliveries of agricultural goods requires not only that order be imposed on transportation main lines and freight yards, but also that packaging be properly organized and that transport of vegetables in containers be put into wider use.

Our republic's laborers have accepted, with great interest and approval, the initiative of the people's deputies from Saratov Oblast. These deputies appealed to the laborers to develop an all-union campaign with the motto "Preserve Everything That Has Been Grown!" And the Latvian transport workers can draw a great deal of value from the Saratov Workers' experience. For example, there is the efficient method of transporting grain according to hourly schedules, which results in freeing a large number of motor vehicles and more quickly delivering grain from combine to dryers and then to a grain elevator. As required by a decree of the Presidium of our republic's Supreme Soviet, this method must be universally put into use and developed, as must other useful undertakings which promote quick delivery and a high level of safekeeping for agricultural products.

The struggle for savings and thrift, and the reduction of losses are some of the basic tenets of the Food-Supply Program. And in carrying out the program, it is more important than ever to be more demanding of the work of each segment of the transportation production line. First and foremost, the party organizations must concern themselves with this. Who better than communists can set an example of great personal responsibility for the fate and safekeeping of the harvest?

With each passing day, the work rhythm of the harvest campaign becomes more intense. The harvest campaign requires great exertions, not only from the agricultural workers, but also from workers at transport enterprises and organizations. The primary task of the transportation workers is to transport the new harvest in exemplary fashion, assuring that delivery of agricultural goods to consumers is done in a smooth and timely manner, without losses.

9887
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MECHANIZATION OF SUBWAY TUNNEL CONSTRUCTION DISCUSSED

Moscow TRANSPORTNOYE STROITEL'STVO in Russian No 8, Aug 82 pp 12-15

[Article by Candidate of Technical Sciences L. S. Afendikov, V. M. Auerbakh (TsNIIS) [All-Union Scientific Research Institute of Transportation Construction] and S. N. Vlasov (Glavtonnel'metrostroy) [Main Administration for the Construction of Tunnels and Subways]: "The Modular Principle in Designing Mechanized Systems for Subway Tunnel Construction"]

[Text] In the "Basic Directions for the Economic and Social Development of the USSR During 1981-1985 and for the Period Up to 1990," the need is discussed for the extensive use of the modular principle, together with standardized units and assemblies, when designing new machinery, equipment, gear and instruments.

The modular principle is a method of designing systems which are not made up of individual specially-designed elements or units, but rather, standardized modules. This principle simplifies the manufacture and assembly of the equipment and facilitates the repair process for a system, since malfunctioning modules are replaced with new modules, which considerably facilitates system operation.

In general, a module is a standardized unit or part of a complex system. A module consists of mass-produced interchangeable components and it executes an independent function in various types of equipment.

There is a basic difference, between the modular principle and the widely-used aggregation principle. Aggregation is the method of putting together machines, instruments, equipment and other items from a number of standardized components, units and assemblies which are geometrically and functionally interchangeable. However, with the aggregation method, functional autonomy is not provided for, so the modular principle can be considered, to a certain extent, to a further development and improvement of the aggregation method.

Introducing modular systems is particularly important in transport construction, especially in subway and tunnel construction. The complexity of tunnel-driving equipment and the difficulty of servicing and repairing the equipment in operational conditions make high demands on the efficiency and reliability of the equipment.

The mechanized tunneling systems, which are used to drive subway tunnels between stations, consist of consecutively joined units of equipment, with an overall mass of 325 to 350 tons. Such systems are 60 meters in length. Thus, the KM-24-0 system consists of 14 units, including a mechanized tunneler, a tunnel surfacing machine, 2 conveyers, a roller conveyer, 3 flat cars with equipment, a carriage for injecting mortar. A malfunction by one of these units causes the entire system to shut down; replacement of a malfunctioning safety unit leads to a lengthy interruption of the tunneling process.

While driving the 1.4 km tunnel on the Kalinin Radius of the Moscow subway system in 1978, the KM-20-0 system had 3 lengthy break-downs (21 days, due to the reduction gearbox breaking; 6 days, due to a malfunction of the face conveyer; 8 days, due to deformation of the rotor's arms). During construction of the Krasnopresnenskiy Radius, the same system was idle for more than 2 months, due to a malfunction of the main drive shaft. To eliminate this defect, a dis-assembly room had to be built and the drive shaft assembly, with a mass in excess of 17 tons, had to be hoisted "from the pit to the surface."

Based on an analysis of tunneling systems' operations, it has been established that their readiness factor did not exceed 70-75 percent. This means that idle time, simply due to equipment problems, takes up almost one-third of the systems' overall operation time. It is well known, from reliability theory, that the probability of trouble-free operation for a tunnel-driving system, made up of a number of consecutively-joined mechanisms, is expressed as the product of the probabilities for trouble-free operation of each of the system's elements. In other words, the reliability of a system made up of many consecutively-joined elements is no greater than the reliability of the least reliable element in the system.

Another peculiarity of tunnel-driving equipment operations is the complexity resulting from the changing geological conditions along a tunnel's route. In Moscow, while driving the tunnel of the Kalinin Radius, the excavating equipment system encountered an obstacle in the form of unstable water-bearing sand. The impossibility of re-equipping the face section of the equipment in the tunnel resulted in a lengthy stoppage in tunneling. It was only after special soil-fastening methods had been used that the tunneling was resumed. In another instance, when the KTI-5.6 system entered an area with lenticles of flooded soil on the Serpukhov Line, the system had to be completely disassembled and the tunneling was executed in a non-mechanized manner.

To increase the use of tunnel-driving systems, an effort is being made to make the systems as multi-purpose as possible. Thus, the KT-5.6D2 system is equipped with changeable earth-moving and milling units. However, such a decision complicated the system's design and made its manufacture more expensive. In a number of instances, changeable equipment does not find an application and thus remains unused.

There is another opinion, which states that systems should be specialized. As expressed by Professor V. P. Volkov: "We must not consider one and the

same tunneler as all-purpose equipment for driving tunnels through diverse strata. Special tunneling equipment should be selected for each type of stratum."[1]

Thus we have a contradiction. On the one hand, all-purpose equipment is more expensive to build; on the other hand, specialized application restricts the equipment's use.

To resolve this problem, we must turn to the modular principle in designing tunnel-driving systems.

It seems expedient to construct a tunnel-driving system of consecutive autonomous units and modules, connected only in a functional sense. The combination of modules meets the system's production purpose and, depending on the conditions of tunneling, can be modified within a broad spectrum. Replacing a module which has malfunctioned does not present serious technical problems. If the geological conditions change during tunneling, the corresponding modules can be replaced. The solution is simplified for the problem of equipment being held in reserve.

The elements of modular systems are present, to one or another degree, in a number of designs for tunnel-driving systems in our country and abroad. This relates particularly to mechanized driving of mountain tunnels, which is accomplished by the blast-hole method. In this method, the processes for working the face and loading the soil are separate and are accomplished with the aid of independent units--a drilling machine or a carriage and rock-loading machine. Also, the form-work for concreting the tunnel lining is an independent unit--a drilling machine or a carriage and rock-loading machine. Also, the form-work for concreting the tunnel lining is an independent element. Figure 1 shows the production diagram for driving a highway tunnel by the blast-hole method, with the aid of a drilling carriage (4), a loading machine (1), cars with bottom unloading (2) and a machine for heaping up concrete fragments (3).

The ABT-5.5 drilling system (Figure 2) can serve as an example of using specialized modules in subway construction. The system makes partial use of autonomous units--a drilling carriage (1), a rock-loading machine and a car. The erector arm (2) and carriage (3) for injecting mortar have been used in a traditional manner and are not autonomous units. The self-propelled BUR-2 carriage with two drills accomplishes the drilling of the face, after which the carriage is diverted to a reserve track. After the blasting is completed to the face, the carriage is replaced by the PPN-5 rock-loading machine, which loads the blown-up mass in cars with a 1.5 cubic meter capacity.

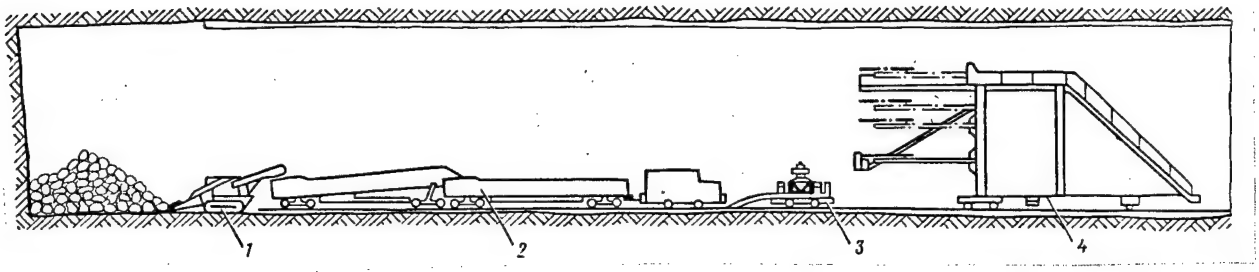

Figure 1

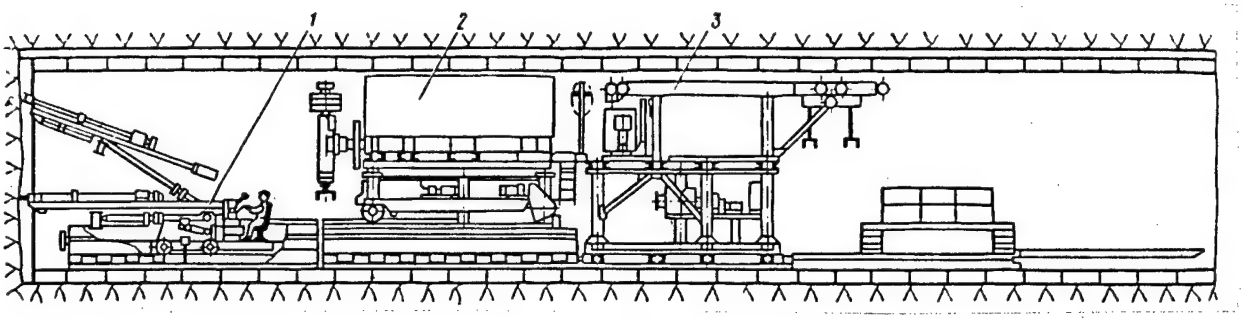

Figure 2

The experience of using the 4PP-5 tunnel-driving combine is well known. The 4PP-5 is used to work a section up to 35 meters in soil where $f = 4 \div 6$, in combination with the PNB-3D loader and a dump truck.[2]

The KM02x5 system for tunnels driven by the open-cast method[3] between subway stations can also serve as an example of using the modular principle. There are independent modules in the system--a moveable support, the KKTS-20 mass-produced gantry crane, the EL-4121 earthmover, bulldozers and dump trucks.

It is expedient to introduce the modular system in two phases into subway construction.

In the first phase, one must orient oneself to making maximum use of functional units, which have been produced by industry, put into operation, and designed to carry out separate operations. Machinery and equipment which are lacking must be designed and put into production.

In the second phase, the modular principle is fully implemented: one must design new modules from standardized, mass-produced components. At the same time, individual components and parts of the modules will be standardized; for instance, the drive mechanism, power plants, hydrocylinders and elements of conveyers and the transmission will be standardized.

A single system of modules must be developed which encompasses the broad spectrum of tunnel-driving operations in subway construction, taking into account the long-range development of this branch of industry. Tunnel-driving equipment must be ordered in accord with this system.

The modules must assure the completeness of tunnel-driving systems for various engineering and geological conditions of tunnel-driving. One must provide for diverse variations in technological plans for open-cast, close-cast, drilling and nondrilling methods of tunneling; for blast-hole and mechanical methods of working a face; for sectional (including those pressed out in working) and one-piece tunnel linings; for rail and non-rail transport in a tunnel. At the same time, one must strive to standardize the modules which could be used in various tunneling systems so that a maximum number of technological plans can be fully equipped with a minimum number of modules.

The following system for designating modules is proposed. The designator consists of the letter "M" (module) and a series of numbers indicating the module's purpose (figure 3). The technological purpose of the module is indicated by two numbers, in accord with the following list: 01 means reinforcing a working; 02 means working the earth; 03 means removing a rock mass in a face; 04 means loading rock; 05 means assembling (erecting) a tunnel lining; 06 means conveying earth, 07 is delivering structures, elements of tunnel linings, fillers and other goods; 08 is supplying concrete mortar; 09 means injecting mortar. Then the tunneling method is indicated: 1 means close-cast, 2 means open-cast. Then comes the system of transport (or displacement): 1 means a rail system is used, 2 indicates a non-rail system. After that, the method of working the earth is given: 1 means cutting, 2 means earth-moving, 3 means milling, 4 means striking, 5 means blasting. Finally, the type of tunnel lining erected is designated: 1 means sectional, 2 means one-piece (compressed one-piece), 3 indicates that arches, stays and concrete fragments are used. Positions have been reserved at the end of each indicator.

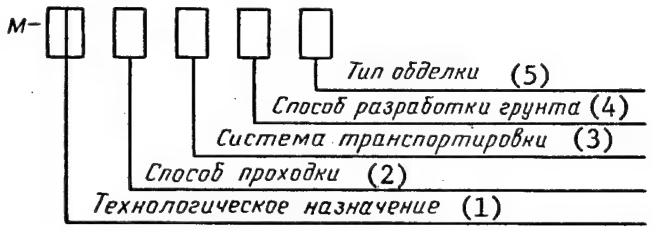

Figure 3

Key:

1. Production purpose
2. Driving method
3. Transport system
4. Method for working earth
5. Type of tunnel lining

A tentative list of modular units (for the first stage of introducing the modular principle) has been provided in the table. As an example, let's examine the systems made up of modules included in this table.

For driving a subway tunnel between stations, with a sectional tunnel lining, in firm clay soil, using a rail system for haulage, the production series

of modules can be represented in the following manner: M-01.1.0.0.0, M-02.1.0.2.0, M-04.1.1.2.0, M-05.1.1.0.01, M-07.1.1.0.0, M-06.1.1.0.0, M-06(07).1.1.0.0, M-09.1.0.0.0.

An analogous tunnel in rocky earth can be driven, using the following series: M-01.1.0.0.0, M-02.1.0.2.0, M-04.1.1.2.0, M-05.1.1.0.01, M-07.1.1.0.0, M-06.1.1.0.0, M-06(07).1.1.0.0, M-09.1.0.0.0.

As can be seen from these examples, six of the eight basic modules are interchangeable for different tunneling conditions.

Table

Module Designator	Machine & Equipment Name	Application	Notes
1	2	3	4
M-01.1.0.0.0	Tunnel Driller	Close-cast driving method. Unstable, weak and moderately hard earth (f=0.3÷6)	Type Shch N-1S
M-02.1.0.2.0	Face Unit with Earth-Moving Final Control Element	Close-cut driving method. Weak and moderately hard earth (f=0.5÷4)	New model (uses KT-5.6 B2 Earth moving equipment)
M-02.1.0.3.0	Face Unit with Milling Final Control Element	Same as above (f=4÷5)	Mounted on base of M-02.1.0.2.0
M-02.1.0.4.0	Face Unit with Striking Final Control Element	Same as above (f=5÷6)	Mounted on base of M-02.1.0.2.0
M-02(03).1.2.3.0	Tunneling Combine	Close-cast driving method. Firm earth, moderately hard (f=2÷6)	Type 4PP-2 or 4PP-5
M-02.1.1.5.1(3)	Drilling Carriage	Close-cast driving method. Firm earth, moderately hard and rocky (f>4)	Type BUR-2
M-03(04).1.1.5(4).0	Rock-Loading Machine on Rails	Close-cast driving method. Blast-hole method for working a face. Rail Transport	Type 1PPN-5

[Table continued on following page]

M-03(04).1.2.5(4).0	Same as above	Same as above Non-rail Transport	Types PNB-3K and PNB-3D
M-04.1.1.2.0	Conveyer on rails	Close-cast driving method. Mechanized working and loading of earth	Mounted on base of 1PPN-5
M-04.1.2.2.0	Same as above	Same as above	Mounted on base of PNB-3K; PNB-3D
M-05.1.1.0.1	Erector arm (tubing arm)	Close-cast driving method. Sectional lining	New model
M-06.1.1.0.0	Mine car	Close-cast driving method	Standard model
M-06(07).1.1.0.0	Electric engine	Same as above	Types 7KR, 10KR
M-07.1.1.0.0	Block Hauler	Close-cast driving method. Sectional lining. Rail transport	Standard model
M-08.1.1.0.0	Concrete hauler	Close-cast driving method. Sectional or one-piece lining. Rail transport	Type PBN-3 with capacity of 1 to 1.5 cubic meters
M-06(07).1.2.2.0.0	Dump truck	Close-cast driving method	Standard model
M-07.1.2.0.1	Tractor	Close-cast driving method. Sectional lining Non-rail transport	Mounted on base of M-06(07).1(2).2.0.0
M-09.1.0.0.0	Carriage for injecting mortar	Close-cast driving method. Sectional or one-piece lining	Mounted on a standard base
M-07.2.1.2.1	Gantry crane	Open-cast method for constructing a subway	Type KKTS-20
M-02(03,04).2.2.2.1	Earth-mover	Same as above	Type EO-4121
M-02.2.2.2.1	Bulldozer	Same as above	Standard Model
M-01.2.0.2.1	Moveable supports	Open-cast method for driving tunnels. Complete section lining. Weak and moderately hard earth (f=0.5÷4)	Type KMO 2X5

[Notes on following page]

Notes: 1. A number in parentheses indicates the module can be used, in accord with a given indicator, together with the basic module.

2. The number "0" means that the module is not specialized in accord with the corresponding indicator, i.e. it can be used within the limits of the entire group.

An analysis shows that a significant number of modules are already being used in subway construction (some of them are shown in figure 4). A number of units must be developed anew. Thus, a compact moveable erector arm (M-05.1.1.0.1) must be developed which will erect a sectional tunnel lining within the time alloted for that operation.

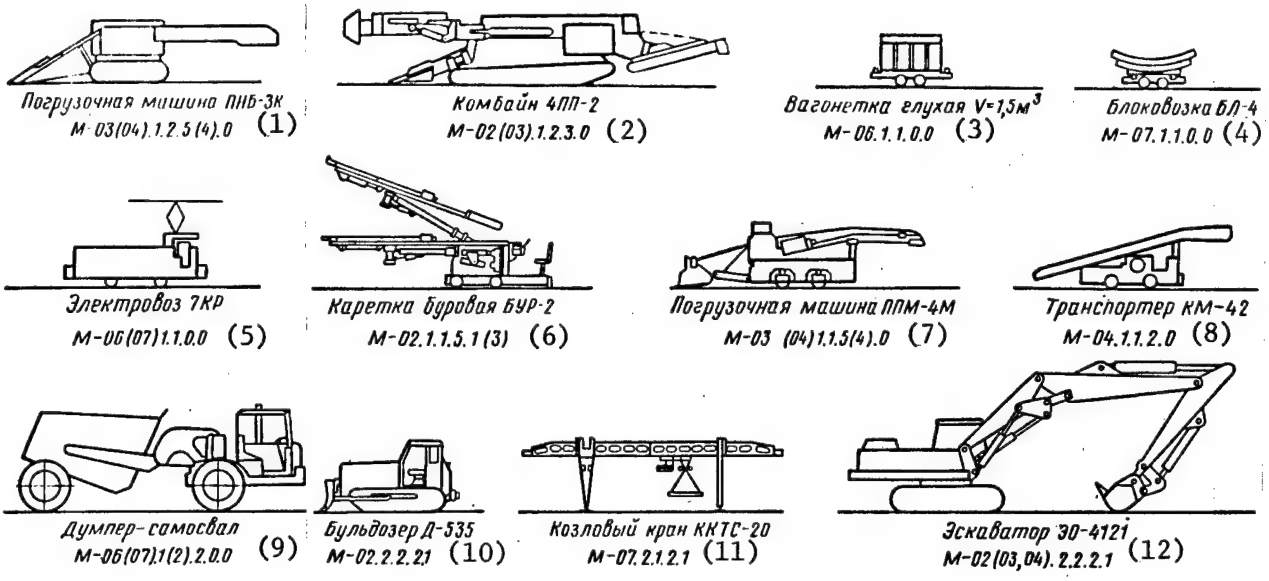

Figure 4

Key:

1. PNB-3K Loading Machine. M-03(04)1.2.5(4).0
2. 4PP-2 Combine. M-02(03).1.2.3.0
3. Fully Enclosed Car. $V=1.5m^3$. M-06.1.1.0.0
4. BL-4 Block Hauler. M-07.1.1.0.0
5. 7KR Electric Engine. M-06(07).1.1.0.0
6. BUR-2 Drilling Carriage. M-02.1.1.5.1(3)
7. PPM-4M Loading Machine. M-03(04)1.1.5(4).0
8. KM-2 Conveyer. M-04.1.1.2.0
9. Dump Truck. M-06(07).1(2).2.0.0
10. D-535 Bulldozer. M-02.2.2.2.1
11. KKTS-20 Gantry Crane. M-07.2.1.2.1
12. 30-4121 Mover. M-02(03,04).2.2.2.1

So far, there is no tunnel earth-mover for working the faces. A face must be developed, with an aperture in its drive section for loading earth which has been worked onto a conveyer.

For each of the designated technological plans, we must compile a list and indicate the quantity of applicable modules, taking into account that they are being held in reserve. We must also develop cycle norms for accomplishing work, taking into account the rearrangement of modules in the process of executing the tunnel-driving cycle. Based on these cycle norms, we will determine the time needed for individual operations, the required productivity and speed for moving individual modules. As a result, we will find the productivity, technical and economic efficiency of the overall system.

The modular principle must become the basis for creating a new family of tunnel-driving machines which will help increase the efficiency of constructing subways in our country.

FOOTNOTES

1. "Tonneli i metropoliteny" [Tunnels and Subways], edited by V. P. Volkov, Moscow, Izdat. Transport, 1975, p 309.

2. See: TRANSPORTNOYE STROITEL'STVO, 1982, No 2, p 14.

3. See: METROSTROY, 1980, No 6, p 20.

9887
CSO: 1829/299

PORT OF KLAIPEDA USING NEW ALL-WEATHER GRAIN-HANDLING INSTALLATIONS

Moscow VODNYY TRANSPORT in Russian 10 Aug 82 p 1

[Article by S. Borik: "The All-Weather Installations Are in Operation"]

[Text] The spring and early summer were dry in Klaipeda. Work on the docks at the port was literally feverish. There were many days when the port workers sent off more than 200 railroad cars of food. A militant attitude reigned in the collective, but a few people in the port would glance nervously at the skies, waiting for the downpour to begin.

We should stipulate immediately that these people were just as deeply concerned for the work of their enterprise as the others.

When the rains finally broke out in late June these few people became the focus of attention for the port collective, because they began testing the all-weather bunker installations for loading grain from ships into railroad cars. They are jokingly called in the port the "Klaipeda modification" of the units from the Black Sea Planning and Design Bureau. They are well-known in the ports of our country for the complexity of introducing them, which is because the manufacturing plants do not have many hydraulic devices and other special equipment.

Several enterprises of the sector worked on improvement of these Black Sea units at the Klaipeda ship repair yard. The most experienced brigades were brought in. They all knew that these installations would help unload grain in bad weather and, therefore, raise the working efficiency of the fleet and the port. By this time the innovators at the Klaipeda seaport already had their own version of a solution to the problem. In fact, in 1980 the port design bureau formulated the schematic diagram of the bunker installations that was manufactured in 1981 at ship repair yard No 7 and it has already been operated for a year.

The designers implemented many resourceful and bold technical concepts to take their own used machinery and mechanized equipment and from it make a bunker installation which, even though simple and far from perfect, could transship the grain. We should recall that this was at a time when dozens of ships stood in line waiting for unloading in the port and even when railroad cars were supplied according to plan the rate of ship processing was below requirements.

The designers took two cranes that had been written off and using them designed two installations on an urgent basis. Here is how they were laid out. Bunkers to accumulate the grain were built in the portals, and two pneumatic machines were installed in each of them. The boom in which the grain conduit was mounted remained immobile, but they were still able to modify the radius of the boom's operation minimally. Thus it did not hinder the mooring of the ship.

When these two installations were put into use the port began to unload grain more smoothly. It is true that their productivity was markedly less than the rate of grapple load-processing, but on the other hand bad weather did not stop their work. During rain and snow these two installations pumped 1,500 tons of grain a day apiece from the ship into the railroad cars. Fleet downtime was reduced and railroad cars, which formerly had accumulated at stations near the port during bad weather, were put to use.

The all-weather bunker installations built according to the Black Sea design were conceived on a much more sophisticated basis than the Klaipeda design. Their boom is not limited to two maneuvers "up-down" and "further-closer," but rather is fully rotatable. It has a number of other advantages, but as pointed out above, they have not been able to use them. Port workers still do not know when all the units necessary to operate the installation will be delivered. Can they really be intended to stand idle so long? That is why the Klaipeda workers decided to modernize them. And as a result the new "hybrid" bunker installations have demonstrated an appropriate growth in labor productivity. Thus, thanks to the efforts of the innovators the port of Klaipeda today already has four operating all-weather installations. Rain and snow will no longer interfere with grain unloading.

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CSO: 1829/335

OCEAN AND RIVER

CARRIERS CRITICAL OF PORT'S ATTITUDES

Moscow VODNYY TRANSPORT in Russian 29 Jul 82 p 1

[Article by V. Zhivotkov: "Troublesome Trifles"]

[Text] At first (back in the spring) the managers of the Volgo-Don Shipping Company were not particularly enthusiastic when they heard the news that the rivermen on the Don were to carry half a million tons of grain from the port at Zhdanov. The task seemed difficult to them. But an assignment is an assignment, and they got the preparations under way for the shipments that were to come.

The rivermen immediately informed the administration of the Azov Sea Shipping Company that only loaded vessels were to call at Zhdanov for grain. It would depend on the port personnel how skillfully they would be able to handle them. They were thus given conditions. The first was to organize rapid unloading of the vessels carrying bulk cargo. The second was to provide a capability for cleaning and washing the holds to receive the grain. The third was to make the necessary repairs on the holds and hatch covers of the vessels in order to ensure delivery of the grain without loss.

We will be objective: the conditions were not really exaggerated or unfair. The port personnel did not make any objections about fast unloading, but the questions of cleaning and repairing the vessels met with stubborn resistance on the part of the managers of the port of Zhdanov. They looked for any excuse to "escape" their elementary duties in preparing the ships to receive grain.

While the departmental disputes between the rivermen and the seamen were taking place, the amounts of grain to be carried from Zhdanov were doubled. The rivermen sighed and the seamen finally understood that they should not get upset over a "trifle." The scale of the task which was set smoothed out their departmental implacability, and both sides understood that they had to tackle the job seriously. Of course, at first nothing went right, there were frustrations, insults and altercations. But there was a manifest feeling that every day there was greater mutual understanding, smoother interaction, and a readiness to meet each other halfway.

We should immediately take note that the rivermen had to assume the larger burden and to go through considerable difficulties. Most troublesome of all was the shortage of large through-transit vessels. Strict accounts were kept of every vessel, time was reckoned not in days, but in hours and minutes. The crews of vessels, plants owning vessels and the administrative staff of the Volgo-Don Shipping Company were motivated by a single desire: to fulfill the assignments for shipment of grain from Zhdanov without fault.

June proved to be particularly difficult. Because of the arbitrary and nonchalant attitude of the managers of the related river shipping companies (especially the Volga) tens of thousands of tons of scheduled ships did not reach the basin during the month. Nevertheless, the rivermen of the Don took maximum pains and initiative to furnish ships to the port of Zhdanov without interruption for transshipment of the grain. On the last day of June A. Osenniy, deputy chief of the traffic and fleet service of the Volgo-Don Shipping Company said in an interview with undisguised joy and pride:

"Nevertheless, in spite of everything, we have been able to fulfill every 10-day assignment for the shipment of grain from Zhdanov. And for the month as a whole we carried 110,000 tons of grain instead of 100,000...."

One cannot but share these feelings of deep satisfaction with a debt discharged. It is quite clear that the basis of the success in transshipping the grain was the cooperation between the rivermen of the Don and the seamen of the Sea of Azov in getting the job done. One might cite quite a few examples of unity of word and deeds of ships' crews, consolidated mixed teams, dispatcher staffs, and shipping company administrative personnel. Nevertheless, even in such pleasant moments of a feeling of success in one's work, mention should be made of the troublesome trifles which are continuing to stand in the way of the common cause.

Unfortunately, the port personnel of Zhdanov are still ignoring the urgent requirements of the crews of river vessels concerning repair of holds and hatch covers. To be frank, there is after all no problem whatsoever here in essence. By displaying elementary resourcefulness and willingness, it would be possible to organize a station consisting of a few workers. All that is needed is an electric welder, a gas cutter, and a hull fitter. But at present the port does not even have a repair station that is always on duty, nor does it have a specialized team.

The dispatchers of the Volgo-Don Shipping Company are now trying as a rule to send vessels there which do not need repair. It is easy to imagine what enormous effort this costs when there is an acute shortage of tonnage suitable for grain. But even those few vessels which do need repair still encounter a cool reception in Zhdanov. For example, at the very approach to the port, when he had the dispatcher's order to load grain, the captain of the Don motor vessel "Drogobych" put in a request for repair work. On the evening of 21 May the vessel arrived in the port of Zhdanov and started to unload. On the morning of 23 May it was taken out to sea to pump out water after the holds were washed. On the evening of 24 May the "Drogobych" returned to its berth, and that is when its misadventures began. The chief of the shift of the second

loading area turned out to know nothing about the request for repair work. A bus had to be sent at night to bring the welder and gas cutter from their homes. Then they began to decide how they were going to deliver the welding equipment to the vessel. It was nearly morning before the simple repairs were made.

But the ordeals did not end there. During the entire day of 25 May the motor vessel was driven from one berth to another, and only at 2200 hours did loading begin. At 1500 hours on the next day the shift loaded with grain departed.

Yet another example. On 26 June the Zhdanov port personnel flatly refused to do repair work on the motor vessel "Kosino." In its hold a piece of ballast pipeline was broken and torn out. It is significant that on its previous trip the "Kosino" had carried grain from Zhdanov. Instead of a good word from the port personnel for having delivered the grain properly to its destination, the crew encountered ingratitude.

So far the port personnel has been unable to find and adapt a floating tank to take on the water from river vessels after the holds are washed. Is this good management--to drive a vessel out to sea and to lose more than a day of valuable time?

The stowing of grain in the holds and the filling out of cargo documents take an extremely long time. For example, on 28 June the motor vessels "Volgo-Don-5045" and "Volgo-Don-5046" completed the loading of grain at the same time, at 0500 hours, but its stowage by port personnel and the filling out of documents dragged on until 1130 hours. The Don rivermen are anxious to help the grain procurement people in speeding up the delivery of grain. And why do the crews not stow the grain in the hold with their own manpower, receiving proper payment for this? It will bring a large gain.

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CSO: 1829/300

OCEAN AND RIVER

CASPIAN FERRY SERVICE OVERLOADED, UNDERUTILIZED

Moscow VODNYY TRANSPORT in Russian 29 Jul 82 p 2

[Article by M. Berchiyan: "Without Transshipment, But With an Argument"]

[Text] How To Increase Operating Efficiency of the Ferry on the Caspian

It costs about 11 rubles to carry 1 ton of tea by sea from Baku to Krasnovodsk. But around the Caspian, via Kizlyarskiy Khod and the Transvolgan Steppes, more than 100. There is clearly a very large gain from carrying the goods by sea.

And it is strange when you learn that hundreds of railroad cars from the Transcaucasus and Central Asia are caught up in a whirling counterflow bypassing the Caspian. The losses to the state from this "whirligig" are by no means small. Shipping costs increase 144 rubles per car which takes the roundabout route.

This is also strange because some 20 years have already passed since the main ferry, the "Sovetskiy Azerbaijan" received the first loaded train from the railroad workers, carried it over the Caspian Sea and turned it over there to the Central Asian Railroad. The ferry set off on the return trip that very day. That was the beginning of sea ferry service.

But why is it that many trains are still going by the roundabout route which is economically less advantageous? The explanation for this wastefulness is that the Caspian Ferry is unable to handle the flow of railroad cars, and therefore railroad rolling stock piles up in Baku and stands idle.

The capabilities of the ferry are, of course, limited. The Caspian Shipping Company refuses a large number of requests from its customers in planning annual operation of the "floating bridges." At the same time year after year they fail to utilize the full carrying capacity of the ferry. In other words, not all the customers are given the opportunity to make use of the advantages of the Baku--Krasnovodsk Sea Ferry, and meanwhile the ferries themselves are by no means completely utilized.

What are the reasons for this? The present form of recordkeeping and reporting makes it possible to answer this question with considerable accuracy. Unfortunately, there are many such reasons.

The principal one is the regular delay in loading railroad cars on the vessels, as well as the dispatching of the ferry underloaded or with no cars at all (with passengers). One can go back to all the years of the ferry's operation. We will give here the figures for recent years. In 1980 the ferries lost 565 hours of operating time for this reason, which corresponds to a loss of the ferry's carrying capacity amounting to 1,000 cars. These figures, which represent the unutilized capabilities of the seamen, the railroad workers and the customers--the country's economy--increased in 1981 and they are climbing upward even now.

Over the first 6 months many hundreds of cars fewer than planned were delivered to the ferry from Baku. The gap between the plan and the actual figure is still greater for railroad cars from Krasnovodsk. Whereas the ferries leave Baku without cars on two trips and half-loaded on four, they leave Krasnovodsk on 20 trips without cars and on 15 half-loaded.

The picture becomes much worse if we add to these figures the unused capabilities resulting from tardy departures of the ferries. A. Ragimov, chief of the staff service for operations and movement of the fleet of the Caspian Shipping Company, spoke about this:

"In the first quarter the ferries were delayed in the port of Baku 122 hours through the fault of the railroad, 8 hours through the fault of the port, and 92 hours because of the handling of vessels which were behind schedule. If it had not been for these losses of operating time, the ferries could have carried tens of thousands of tons of additional cargo."

Yet after all everything that is required of partners in the transportation system for better use of the Caspian Ferry has been set forth straightforwardly in the transportation junction agreements--in Baku and Krasnovodsk. On the west bank, for example, the first requirement is that at least 150 freight cars ready to roll are to be standing in the port and station yards. It is also stipulated that the handling of ferries must begin no later than 30 minutes after the vessel's arrival.

But does practice conform to what is stated in the junction agreement? Not always by any means. An analysis of the handling of the ferries by elements of cargo-handling operations showed that the main reason for delayed departures was exceeding the time set aside for cargo-handling operations. There is an organizational defect in the system for filling out documents, a shortage of traction, and many other things.

Here is an example. What cars are considered ready to roll? Those which have already been sorted by weight for proper location on the four tracks of the ferry's train deck. This sorting is delayed. And it is usually delayed because there is a great deal of trouble eliminating the defective cars, that is, those which do not meet technical and commercial requirements. All of this preparatory work takes additional time beyond what is allowed even when switching locomotives are available, but it must be said that there are not always enough of them.

Thus it happens that hundreds of cars are brought to the ferry crossing, but the ferries depart behind schedule, underloaded, because there are not enough cars in proper condition.

Twenty years is a sufficient period of time to achieve full utilization of a ferry's carrying capacity. Here is what D. Gashumov, head of the shipping company, has to say about this:

"There has been a substantial reduction of trip turnaround time (reysoborot) and also time spent in preventive maintenance. The loading of the ferries has been increased by carrying automobiles. The Shchekino method has been used to reduce the size of ship crews. All of this is making the operation of the ferries more efficient, but they are still railroad car carriers, they were built to carry railroad rolling stock. Over the last 20 years our partners have unfortunately not undertaken anything or proposed anything essential to improve the organization of ferry service...."

Our newspaper has already written about how the organization of acceptance and delivery of railroad cars carried by sea is imperfect. And it can be improved. To speed up the handling of ferries it would be advisable to change the procedure so that the Krasnovodsk railroad people accept the cars at Baku, and the Baku people at Krasnovodsk. If there were this kind of organization within a single sector (Ministry of Railways), the ferry crews would be left with the concern about proper loading of the vessel, about carrying the cars competently, about securing them reliably, about unsecuring them, and about safety en route. This excludes many cases of formalism on the ferry, reduces arguments among the partners, improves monitoring so that the cars are promptly prepared in accordance with their technical and commercial condition.

D. Gashumov, head of the Caspian Shipping Company, proposes an interesting innovation in this respect:

"The shipping company is ready to put four of its inspectors under the operational supervision of the railroad people. If the partners in the Baku Freight Station would make the same number available, this patrol team would considerably speed up the handling of freight cars."

The proposal seems to be altogether sound. It seems that we will be forced to undertake precisely that organization of the job. And very soon. The Caspian Shipping Company will be receiving new ferries during the 11th Five-Year Plan. The number of them in operation will increase. There will also be an increased flow of freight cars. And then the present system of accepting and delivering freight cars will prove to be absolutely unsuitable. Then the hindrances will grow to become obstacles. Why do we have to wait until we are "choked" with a jam if it is possible to escape the growing hindrances in good time?

We feel that another problem has also become urgent. It is related to the fact that over the past 20 years a system of ferries has been built up in the country. Yet administration of the ferries remains within the framework of administration of the freighter fleet by regions. It would seem the time has

come to centralize the administration of freight service in the USSR. A center is needed for coordination of all direct intermodal rail-water connections. Presumably then it will not be necessary to send railroad trains roundabout and to dispatch sea ferries half-loaded.

That is when ferry service will also run smoothly--not only without transshipment, but also without arguments.

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CONSTRUCTION OF NEW GRAIN-HANDLING, OTHER FACILITIES AT PORTS

Moscow VODNYY TRANSPORT in Russian 7 Aug 82 p 1

[Article by V. Aristarkhov, head of the All-Union Association of Shore Construction and Delivery of Export-Import Equipment of the USSR Ministry of the Maritime Fleet: "From the Baltic to the Pacific — The Locations of the Key Maritime Construction Projects Associated with Fulfillment of the Food Program"]

[Text] The Food Program, a key challenge of the present day, is not the work of crop farmers, livestock raisers, procurement and transportation workers alone. Construction workers are also making their contribution to this national cause. In fact, the capacities of the docks that exist today and the load-handling equipment in use on them is plainly inadequate to process the volumes of food cargo, which increase every year.

What changes in port facilities will take place in the coming years? How is the amount of cargo processed at the country's seaports to be increased? And finally, how will performance of the Food Program be reflected in the seamen, port workers, and shipyard workers themselves, in all the working people of the sector?

Our correspondent asked these questions of V. Aristarkhov, head of the All-Union Association of Shore Construction and Delivery of Export-Import Equipment of the USSR Ministry of the Maritime Fleet.

The way your questions are put already reveals the answers to them. In fact, work on the Food Program in our sector will go forward in two directions, so to speak. The first contemplates construction and reconstruction of ports and an increase in their capacity to process greatly increased volumes of food. In the second area of work we will do our part to insure normal year-round food supply directly to workers in our sector, both those on board ship and in shore organizations. I have in mind here the construction of vegetable and food storage facilities, livestock complexes, and hothouse complexes.

Let us start with the first direction. Work here actually began immediately after the May Plenum of the CPSU Central Committee. At first we discussed

our capabilities at a party meeting of the administration. A little later we discussed the situation again at a joint meeting of the Torgmortrans [Commercial Maritime Transportation] Administration and our administration. Representatives responsible for capital construction from the maritime steamship companies also attended the latter meeting.

What can we single out among the most important challenges of the present day? If we are speaking of new construction the first to mention is the Novotallinskiy [New Tallinn] port. It is not on the map yet, but that is where the country's largest grain-handling complex is being built. The two docks will take ships with cargo capacities up to 100,000 tons. In the future three more docks will be built at the large complex to handle perishable cargo, in particular citrus fruits which our steamships will deliver on a regular basis from the Republic of Cuba.

I will permit myself a slight digression. The story of the citrus plantations on the Cuban Island of Youth (as it is now called) is interesting in itself. Soviet specialists worked together with the Cubans at these newly established plantations. Outstanding oranges and grapefruit were the result of this international cooperation. In terms of taste qualities they are just as good as the famous Morocco products. Our ships are now delivering about 400,000 tons of citrus fruits from Cuba. When the three docks at the New Tallinn port are put into operation this amount will double, and possibly even triple.

The first phase of the New Tallinn port will go into operation in 1985. This is very fast; the giant port must be built in four years. Foreign specialists, in particular representatives from Finnish companies, have been enlisted to help with construction of the New Tallinn port.

Work is continuing on the Grigor'yev Estuary. The port of Yuzhnyy, which is already in operation, is being expanded and new docks are being built to handle bulk cargo. Next year construction will begin on docks for the sulfur and phosphorus fertilizers necessary to agriculture.

As for reconstruction, the first projects to mention here are Odessa and Novorossiysk. Grain-handling will increase substantially with reconstruction of docks Nos 1 and 2 of the Quarantine Breakwater and elevator wharf in the port of Odessa and after dock No 22 goes into operation at the Port of Novorossiysk.

In conformity with an order issued for three ministries, the Maritime Fleet, Procurements, and Railroads, work is going forward to increase the carrying capacity of elevators in the ports of Odessa, Kherson, Nikolayev, and Poti, where imported grain is handled.

This is what our contribution to realization of the Food Program on a national scale will be.

Now we will talk about how we will solve the problems of supplying workers of the maritime fleet. To be frank, these are very serious matters. At the present time the needs of people employed in the sector are far from being met.

There are several reasons for this situation, but I will mention just one. Why has supply to our steamship companies in the Far East become worse in recent years? We often receive this question in letters and people ask the chiefs of the steamship companies this. From his own personal point of view a person cannot see, for example, how the transport fleet in the Far East has grown and how our port facilities have improved quantitatively. This is natural. The swift development of Siberia and the Far East in recent years have led to an expansion of our enterprises. But the food resources of these regions remain as they were before.

That is why we submitted to the collegium of the Ministry of the Maritime Fleet a plan for construction of facilities which will help solve this problem to some degree. During the current five-year plan fruit and vegetable storage facilities will go into operation in Murmansk, Kaliningrad, Ventspils, Ilichevsk, Poti, and Nakhodka. Plans also contemplate launching four large refrigeration units before the end of the five-year plan, in Tuapse, Astrakhan, Termez, and Vostochnyy Port.

Construction of hog feedlot complexes and hothouses is a separate line in the plan. Last year these kinds of complexes went into operation in Sovetskaya Gavan, Provideniye, and Magadan.

Port workers are receiving fresh meat in their dining halls and cafes, not imported meat. In the next three and one-half years we hope to build five more hog feedlot complexes, four of them in the Far East.

If you decipher certain points of our plan you will observe a curious pattern: interests on a national scale are fairly closely intertwined with the interests of the sector. During the current five-year plan the designing and construction of a complex to handle grain products in Vostochnyy Port will begin. It will include docks, an elevator, mills, and a bakery. Flower and mixed feeds will be shipped from Vrangel Bay all over the Far East.

Here is one more example from the not too remote future. In the 12th Five-Year Plan construction of a specialized dock with large refrigerated and storage facilities will be begun in Magadan. Magadan Oblast and the Chukotka region are one of the most remote points in our country, and a large majority of their food is shipped in by maritime transportation during the short northern navigation season. The idea of building a new facility was the result of the collective creativity of workers of the ministries of the Maritime Fleet and Trade and the executives of Magadan Oblast. Completion of this project will make it possible to supply all necessities to this remote northern region and take care of people who, even without this, are living under very difficult conditions in the Far North.

Concern for human beings — this is what has dictated our plans and the projects that have already been carried out. This is precisely why minister of the maritime fleet T. B. Guzhenko is constantly asking how construction is going on the potato storage facility in Murmansk and the hog feedlot complex in Leningrad Oblast. This is precisely why questions of supplying full-value food to

employees of the maritime fleet are often discussed at sessions of the ministry collegium.

I will give just one figure: 17 percent of the total capital investment in the sector for development of shore facilities in 1982-1985 will be used to carry out the Food Program. I believe that this illustrates the real involvement of employees of the maritime fleet in solving this important nationwide problem.

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BRIEFS

FAR EAST PORT CONSTRUCTION—Nakhodka. Hydro construction workers from the Dal'morgidrostroy [Far Eastern Maritime Hydro Construction] Trust began work to build a deep-water pier in Nakhodka Bay today. The pier is being built for the Primorremrybflot [Maritime Kray Fishing Fleet Repair] Association, the largest repair association in the Far East. The new deep-water piers will make it possible to restore seven large factory ships a year, 2.5 times more than can now be handled. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 July 82 p 2] 11176

YUGOSLAV SHIP COMPLETED—Shipbuilders in the Yugoslav city of Rijeka have finished construction of the latest vessel for the Soviet Union. The new dry-cargo ship Shirvan is destined for the Caspian Maritime Steamship Company. Shipbuilding is one of the principal sectors of economic cooperation between the USSR and Yugoslavia. Dozens of tankers, tugboats, dredges, dry-cargo ships, and other vessels have been built in Yugoslav shipyards to fill Soviet orders. [Text] [Kishinev SOVETSKAYA MOLDAVIYA in Russian 3 Sep 82 p 3] 11176

NEW KLAIPEDA DOCK—The Baltmorgidrostroy [Baltic Maritime Hydroconstruction] Trust has begun construction of one more dock in the Klaipeda commercial seaport. The highly mechanized cargo-handling complex with railroad sidings will permit a significant reduction in railroad car-ship operations. A laboratory building for expert evaluation of cargo will be built on the dock. The complex was designed by Lenmorniiproyekt [possibly Leningrad Maritime State Planning and Design Institute]. The dock is to be put into use during the present five-year plan. [By V. Tumanov] [Text] [Moscow STROITEL'NAYA GAZETA in Russian 11 Aug 82 p 3] 11176

KARAKUMY CANAL CONSTRUCTION—Ashkhabad—Construction of the Zeidskoye Reservoir, the largest in Turkistan, is in full swing. The reservoir is at the all-Union shock Komsomol construction project, the Karakumy Canal imeni V. I. Lenin. The future sea will fill an enormous natural basin. It will receive more than 3 billion cubic meters of water and insure stable regulation of the level of the Karakumy Canal. [By V. Mirzoyan] [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 26 Aug 82 p 1] 11176

PORT CONSTRUCTION WORK—During the 11th Five-Year Plan major new transshipment complexes will be launched in maritime transportation, for transshipment of containers and lumber in Vostchnyy Port, and for transshipment of grain in Novorossiysk. Construction workers in 30 ports will build 53 cargo-handling complexes with a total dock length of 22 kilometers and a carrying capacity of 26.4 million tons of cargo a year. [Text] [Moscow VODNYY TRANSPORT in Russian 7 Aug 82 p 1] 11176

USE OF ROBOTS—Kaliningrad—The Kaliningrad Tekhrybprom Experimental Production-Technical Association is setting up the sector's first subdivision of robot technology. Automatic manipulators will perform the most labor-intensive and monotonous operations in mass production of fish output. Designers at the association are using systems that already exist and, of course, will also work to develop new, contemporary systems that meet current requirements for economy and industrial sanitation. The subdivision of robot technology will be a part of the new experimental machine-technological bureau of the association, which has been named by the USSR Ministry of Fish Industry as the base enterprise for the development of new fish processing equipment in the country. [By L. Bazhko] [Text] [Moscow VODNYY TRANSPORT in Russian 7 Aug 82 p 4] 11176

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MISCELLANEOUS

GOSPLAN OFFICIAL DISCUSSES CONTAINERIZATION PROCESS, PLANS

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 8, Aug 82 pp 24-31

[Article by D. Zotov, division chief at USSR Gosplan: "Comprehensive Development, Planning and Efficiency of Introduction of the Container Transportation System"]

[Text] The document "Basic Directions of Economic and Social Development of the USSR for 1981-1985 in the Period until 1990" places before the sectors of the national economy the challenge of insuring optimally efficient use of material, labor, and financial resources, raising the technical equipment-labor ratio, and introducing full mechanization and automation of production processes by every means. The plan envisions raising the productivity of public labor by 17-20 percent and receiving at least 85-90 percent of the growth in national income in this way.

One of the basic directions in solving this problem is the development of container shipping and shipping freight in stacked form.

The resolutions of the 26th CPSU Congress envisioned: "Accelerate the development of the container transportation system, expand shipment of item-packaged freight by the stack-container method, and enlarge the network of specialized points equipped to process containers and stacks."

During the 9th Five-Year Plan container shipping increased 70 percent and stack shipping 150 percent, reaching figures of 66.5 and 170 million tons respectively in 1975. For the first time the country developed a system of shipping using large international-standard containers (gross weights of 20 and 30 tons). Specialized mechanical equipment was built to carry them and transship them at railroad stations and sea and river ports.

The plan for the 10th Five-Year Plan envisioned further development of the material-technical base of container shipping. During 1976-1980 the transportation system received about 700,000 containers of different types (40 percent more than in the 9th Five-Year Plan) and a great deal of specialized

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[1]"Materialy XXVI S"yezda KPSS" [Materials of the 26th CPSU Congress], Moscow, Politizdat, 1981, p 171.

transportation and loading-unloading equipment. As a result, by the end of the 10th Five-Year Plan the fleet of containers in all types of transportation and in industry numbered 1.7 million units, including 500,000 specialized containers. Each year about 6 million pallets were used for stacking small-item freight and 2 million strops for timber. About 120 specialized maritime vessels, more than 200 river steamers and barges, 50,000 railroad cars, and tens of thousands of truck trailers and tractors were introduced into use and more than 1,500 container points were in operation.

In 1980 all forms of transportation carried 145 million tons of freight which could have been delivered to customers economically in containers and 900 million tons of freight which could have been delivered by the stacking method. In fact, 75 million tons of various freight was shipped in containers in 1980 and 250 million tons in stacks. Switching more than 1 billion tons of freight to container and stack methods of delivery by direct transportation-technological schemes from the point of production to the point of consumption would make it possible to introduce on a broader scale full mechanization of labor-intensive and heavy loading-unloading jobs now done manually, to free significant material resources, to raise labor productivity in transportation work, to improve the use of means of transportation, to preserve the freight being shipped better, and to insure more efficient interaction among the cooperating forms of transportation. In concrete terms this can be evaluated by the following figures. For each million tons of freight delivered in containers 1,500 workers are freed, while for stack shipping it is 1,100. The following savings are achieved: 200,000 cubic meters of packaging wood for container shipping and 20,000 cubic meters for stack shipping; 3,000 tons of metal for containers and 200 tons for stacks; and, up to 20 million rubles in operating expenditures for container shipping and up to 4 million rubles for stack shipping.

As a result of the high efficiency and quality of freight shipping in containers and stacks the significance of these methods of shipping output has risen in all sectors of the economy. Several sectors now ship a high percentage of their total freight shipping in universal containers: 89 percent for knitted goods; 82 percent for sewn garments; 83 percent for haberdashery goods; 91 percent for books; 93 percent for domestic articles; 54 percent for output from the radio engineering industry; 41 percent for electrical appliances; and, 46 percent for fabrics.

Enterprises of ferrous metallurgy, geology, and the building materials industry and territorial enterprises of USSR Gossnab have made significant progress in establishing their own stocks of specialized containers and shipping industrial goods in them. Workers in the building materials industry and ferrous metallurgy have done a great deal together with transportation organizations to stack bricks, roofing materials, metal, and other bulk freight. With the participation of the machine building ministries steps were taken in the 9th and 10th Five-Year Plans in all forms of transportation to build and refine a system of technical equipment for container and stack shipping and to develop the material-technical base for their production. Indicators for planning the shipping and progressive shipping technology have been introduced

and a number of other organizational-technical and economic planning measures have been taken. As a result, during the last five-year-plan container and stack shipping rose 80 percent and the necessary conditions were established for further development.

But the national economic need for container and stack shipping is only being 40 percent met. Raising the level of container and stack shipping is a key national economic problem whose correct solution promises to reduce transportation costs by an additional sum of about 2.5 billion rubles. Nonetheless, a number of sectorial ministries and departments which ship freight still are not giving proper attention to this problem. The ministries and enterprises of light industry, petroleum refining, petrochemistry, the timber, pulp-paper, and wood processing industry, and the building materials industry are not doing adequate work to containerize export cargoes (tires, synthetic rubber, cotton, rubberoid, asbestos, pulp, paper, cardboard, fiberboard, and others). There is a significant lag in the use of specialized containers to ship loose, liquid, and perishable freight in the sectors of petroleum refining, petrochemistry, food, and machine building; the same is true of the ministries of light and food industry and trade with respect to stacking item-packaged enclosed goods.

The councils of ministries of the Union Republics, the USSR Ministry of Trade, and Tsentrosoyuz [Central Union of the USSR Consumer Societies] are allowing serious omissions in work to introduce containers, pallets, and stacks for shipping the freight of local industry, consumer goods, potatoes, vegetables, melons, and other agricultural products by through routes from suppliers to consumers. All forms of transportation have substantial reserves for development and raising the efficiency of this shipping by improving the use of existing technical equipment and the organization of shipping.

Expanding container and stack shipping in economically sound volumes requires a systems approach to development of the material-technical base of this shipping, introduction of a uniform system for planning and comprehensive organization of the shipping process, and standardization of economic and commercial law regulation at the level of the national transportation system.

In 1971-1980 the division of transportation of USSR Gosplan and the Institute of Comprehensive Transportation Problems of the USSR Gosplan, together with the sectorial transportation and industrial institutes, insured fulfillment of two comprehensive scientific-technical programs envisioning the scientific development and experimental design work needed to establish a container transportation system in the country.

Introducing the results of this development work and USSR Gosplan's action in singling out planning the development of container shipping as a separate section of national economic plan, together with the organization of current and operational planning in all forms of transportation, insured proportional growth of the essential material-technical base, economical selection of freight for switching to container shipping, guaranteed delivery of containers to freight shippers, and rational use of shipping means.

The principal indicators of development of the container transportation system were established as follows: total volume of container shipping (in tons), including for separate forms of transportation (direct, mixed internal, and international); working and operating stocks of containers, specialized rolling stock for carrying them, container cranes, and other mechanized means to perform freight operations (in physical and standard units, by separate types and type-sizes); and, the network of general-purpose container points and their processing capabilities (in ton-operations). With introduction of the quantitative and qualitative indicators their values were determined separately by types of transportation with the required relationship for through shipment of freight from the freight shipping warehouse to the freight receiving warehouse.

Shipment of freight in large containers was planned to raise the quality and efficiency of container shipping; until the 1970's this was not done in the USSR. This necessitated the organization of container building on an industrial basis plus building new hoisting-transporting machines, specialized railroad cars, sea-going and river container ships, and specialized motor vehicles.

An important feature of the container transportation system is standardization of the types, parameters, and designs of containers, of double- cantilever gantry cranes and port reloaders, electric lift trucks, and other technical means used for transportation and in the warehouses of the freight owners. The types, parameters, and designs of technical means selected meet the requirements of domestic and international shipping and the international agreement concluded by the USSR on establishment of a uniform container transportation system for the CEMA countries, the convention on safe containers, and the customs convention concerning containers (1972), which were worked out with the active participation of Soviet planning and transportation organizations.

A program of jobs was carried out to insure successful operation of a container transportation system with the assigned parameters. It concluded with the development and incorporation of new fundamental technical equipment in production. Among the new means were large containers with 20 tons gross weight; medium containers of new designs with gross weights of three and five tons, double-cantilever gantry container cranes with load capacities of six, 20, and 32 tons, automatic container grapples and spreaders for these cranes with load capacities of five, 20, and 30 tons, long-base railroad flatcars with load capacities of 60 tons, container ships with capacities up to 800 containers (computed on 20-ton basis), truck container trailers with load capacities of 20 and 30 tons, and others.

During the 9th and 10th Five-Year Plans international shipping in containers developed in maritime and railroad transportation. Specialized container complexes and terminals were built in seaports at Leningrad, Ilichevsk, Riga, Vostochnyy, Nakhodka, and elsewhere. The maritime fleet organized international container lines between ports of the USSR and many foreign countries. The specialized container fleet and large international-standard containers are used on them. Large containers were introduced in use among 40 railroad

stations, including the large industrial centers. By 1980 the number of such points was increased to 120. As a result, container shipping between the USSR and the CEMA countries increased five times during the decade.

For transit shipping across USSR territory the Ministry of Railroads, Ministry of the Maritime Fleet, and Ministry of Motor Vehicle Transportation of the RSFSR and the Ministry of Foreign Trade set up the Transsiberian Line between countries of the Far Eastern region and Western Europe; a significant share of the freight on it can be delivered in large containers.

Steps for broader use of container and stack shipping in all sectors of the national economy in the 11th Five-Year Plan were developed by the division of transportation of USSR Gosplan together with interested ministries and departments on the basis of research and experience with planning and organizing container shipping. By 1985 the volume of shipping in containers is to rise to 125-135 million tons and stack shipping to 345-385 million tons (increases of 80 and 50 percent respectively over 1980). During the five years industry is to produce up to 1 million new containers (including 155,000 20-ton containers), 47.5 million pallets and about 8 million other means of stacking, more than 4 million stack-forming articles, up to 2,000 container cranes, 18,400 truck trailers, and various other equipment. Plans envision construction and reconstruction of up to 500 container points, including more than 120 new container points for work with large containers.

Steps are also envisioned to improve the planning of container and stack shipping, to streamline the organization and management of this process, and to establish rates that stimulate these types of shipping.

Carrying out this program demands great efforts from the transportation ministries, the ministries and departments that are supplying the technical equipment of the container transportation system, freight shippers and receivers, planning agencies, USSR Gossnab, the State Committee for Standards, and the State Committee for Prices to develop the material-technical base and form a high-quality container transportation system on a national scale. Work should begin first of all to develop the technical complex of the container transportation system, enlisting a significant number of new ministries to organize production and calling on the enterprises of the freight shippers to produce specialized containers, means of stacking, and simple stack-forming devices. To achieve this goal we must follow a clearcut scientific-technical policy and eliminate shortcomings in this area. It is essential to insure more rational coordination of the parameters and dimensions of different types of containers among themselves and with the dimensions of the means of transportation and coordination of the internal dimensions of containers with the external dimensions of stacks, which will promote more compact arrangement of freight in containers and insure the technological compatibility of all elements of the transportation system in the continuous shipping system.

The lag in development of repair facilities for containers, especially large ones, in all forms of transportation must be eliminated. Bringing the stock of containers into line with the technical conditions of their use and the

requirements of the international convention on safe containers will improve preservation of the freight shipped in them and make Soviet containers more competitive on international transportation routes.

As domestic practice and progressive foreign experience show, container and stack shipping is most efficient when immediately after manufacture the finished output is put in containers or shaped in stacks and in this form is stored, transported, reloaded, and delivered to the customer. During performance of all these operations the consolidated freight unit (containers and stacks) should not be broken down. Under these conditions a high level of mechanization of loading-unloading and warehouse work is insured and the output is fully preserved on its entire path from production to consumption. But containers are often loaded and unloaded manually by freight owners, stacks are broken down en route because of a shortage of reloading machinery, and containers are filled with freight already packaged for transportation.

During the current five-year plan we must step up the development and organization of series production of cranes, port container reloaders and various types of gas lift trucks with load capacities of 20 and 32 tons and automatic grapples, gantry cranes, and small forklift trucks for loading and unloading stacked containers at enterprises. Work must be undertaken to improve the types of specialized means of transportation used to carry containers.

Beginning in 1983 the transportation ministries and councils of ministers of the Union republics will make up annual plans of freight shipping in universal and specialized containers and stacks. This will be done on the basis of assignments for total volumes of container and stack shipping established in the five-year and annual plans of economic and social development of the USSR and they will be ratified following coordination with USSR Gossnab.

With the increased scale of container and stack shipping it is essential to institute a clearcut system of planning to insure rational selection of freight to be shipped in containers and stacks and to define the stages of planning and types of shipping plans, their indicators, and methods and procedures for development, coordination, and ratification. For this purpose USSR Gossnab will envision volumes of shipping of output in universal and specialized containers and in stack form according to freight producing sectors and types of transportation. At the same time it is necessary to determine the scale of production of containers, means of stacking, loading-unloading machinery, and specialized shipping equipment, and the plans for sectorial development must envisage capital investment to expand the system of container points and develop the material-technical base of the container transportation system.

A certain order of development and ratification of plans for shipping freight in containers and packages is to be introduced. To do this USSR Gosplan and USSR Gossnab, with the participation of the Ministry of Foreign Trade, the transportation and other interested ministries and departments of the USSR, and the councils of ministers of the Union republics are to develop and ratify a statute on planning container and package shipping by all types of transportation, including shipment of foreign trade freight and freight in direct, mixed transportation.

Assignments for total volume of container and stack shipping with breakdown by types of transportation will be submitted by USSR Gossnab to USSR Gosplan and ratified in the annual and five-year plans of economic and social development of the USSR.

A uniform procedure for planning comprehensive development of container and stack shipping is being envisioned for all forms of transportation. It has three listed groups: "Freight in universal containers, with large containers singled out," "Freight in specialized containers," and "Freight in stacks."

Annual planning (with breakdown by quarters) of total volume of container and stack shipping and quarterly planning of delivery of freight in universal containers is done on the basis of the requests of planning organizations (associations and freight shipping enterprises). They are submitted to territorial transportation administrations (the administrations of railroads, maritime and river steamship companies, motor vehicle transportation, and civil aviation).

The procedure for quarterly planning of total volume of shipping in specialized containers and stacks is established by the transportation ministries and management bodies of river and motor vehicle transportation of the Union republics and must be reflected in the rules for planning freight shipping that are being developed in each type of transportation.

Annual (by quarters) and quarterly (by months) planning of container and stack shipping in direct, mixed transportation and annual, quarterly, and monthly planning of foreign trade shipment of this freight is done in a centralized manner on the basis of the requests of USSR ministries and departments that ship freight, the state planning commissions of the Union republics, and foreign trade organizations. These requests are submitted to the transportation ministries and departments. The national economic need for accelerated development of export-import shipping and dispatching freight in containers and stacks in direct, mixed transportation determine the advisability of centralized planning in this case.

One of the economic levers that promotes the development of containerization and stack shipping is introduction of substantiated transportation rates for shipping and fees for processing this freight. The existing rates and fees were worked out on different principles. They do not promote, and often even discourage, container shipping by the most economical through transportation routes and they do not give freight shippers incentive to use them. For example, the rate scales for freight shipping in universal containers in rail and river transportation set payments for containers of three and 20 tons and a conversion factor is used for the other types, while in maritime transportation the principle of equal payment for each ton of calculated standard loaded weight of all types of containers has been adopted, and motor vehicle transportation also uses the principle of charging equal payment per ton, but for the nominal load capacity of the containers. The different forms of transportation have adopted unsound differences in profitability by distance of shipping, operations of the shipping process, types of containers, regions

of the country, basins, and lines. This makes handling accounts more difficult and causes additional commercial paperwork. It does not promote accelerated movement of containers, especially in direct mixed transportation.

Many different additional fees have been established in the various forms of transportation for the identical operations with containers and stacks and the charges for transportation and handling operations in motor vehicle transportation are too high. As a result, for example, when freight is shipped in universal containers for an average distance (1,900 kilometers) by railroad transportation the charge for freight delivery by motor vehicle transportation (20 kilometers) and transportation-forwarding services is 2-3 times more than the payment for the primary shipment by rail. USSR Gossnab, coordinating work with the USSR State Committee for Prices and drawing on participation by interested organizations, should work out and ratify the amounts of additional charges added to wholesale prices for delivery of output in specialized containers and stacks. It is essential to review the levels of fees for additional services required in container and stack shipping that are not included in the composition of rates for shipping. In the future as the container transportation system is developed it would appear wise to refine the rate system for container and stack shipping by constructing it on a common economical and commercial law basis establishing uniform rates for mixed shipping and including fees for loading-unloading and transportation-forwarding operations in them.

Measures are envisioned to improve the organization and management of freight shipping in containers and stacks and to raise the efficiency of use of specialized rolling stock, containers, and stacking means. For this purpose the Ministry of Railroads has established Main Administration of Container and Stack Shipping and Mechanization of Loading-Unloading Work with appropriate services on the railroad and the Ministry of the Maritime Fleet has set up an administration for container and stack shipping. The size of the central administrative apparatus of the Ministry of Civil Aviation has been enlarged, and steps are being taken to strengthen the management apparatus for this type of shipping in the Union republics.

In the sphere of organization and management of container and stack shipping in all forms of transportation and in the sectors which use their services, a number of shortcomings prevent full realization of the efficiency of containerization and stacking. As a result the load capacity and freight capacity of containers are not used adequately, the turnaround time of containers and stacking means is delayed, their productivity decreases, and significant downtime for containers and shipping means occurs at stations and in ports, especially at the connecting points between types of transportation as well as in the sphere of activity of the transportation- forwarding organizations of motor vehicle transportation. Given the growing volume of container shipping new demands are made for organization of the shipping process. Freight shipping enterprises must insure introduction of containers in production technology, begin packing goods compactly and without additional packaging in containers (which increases their static load), employ mechanized container loading and unloading extensively, reduce the number of operations with freight in industrial transportation by delivering containers and supporting freight stacking

in the shops that complete the production cycles, and ship output in containers by direct supply schemes from the producer to the consumer, bypassing intermediate distribution depots.

All forms of transportation must undertake work to increase the volume of shipping using available technical equipment and improve its quality and efficiency through internal reserves in organization of the shipping process, above all by speeding up container turnaround. Calculations at the Institute of Comprehensive Transportation Problems of USSR Gosplan show that it is possible to reduce container turnaround time by 48 hours in railroad transportation, by 10 days in maritime transportation, and by 10-15 days in river transportation. To speed up container turnaround and, consequently, increase the speed of freight delivery it is necessary to create conditions for accelerated movement of containers by a continuous scheme. The important elements of these conditions are rational organization of container flows in transportation units: rail and motor vehicle container trains, direct railroad cars with containers that are not sorted en route, and container ships on specialized maritime and river container lines. The container points have a decisive role here. They perform all technical and commercial operations with the containers and coordinate the actions of the cooperating forms of transportation. The work productivity of the container points can be raised by introducing uniform technological processes operating at the connecting point of different forms of transportation.

The current scale of development of container and stack shipping on direct mixed and international routes, the need for constant coordination of the works of the forms of transportation for this shipping, and the necessity of formulating and constantly refining the fundamental transportation-wide documents to standardize the development of the technical complex of the container transportation system, coordinate planning, and organize freight shipping in containers and stacks demand an immediate step-up in the activities of the Interdepartmental Commission on Comprehensive Problems of Development of Container and Stack Shipping and Mechanization of Warehouse Work in the National Economy of USSR Gosplan. Mastering the volume of freight shipping and containers and stacks outlined for the 11th Five-Year Plan and carrying out the measures enumerated here and others to support technical progress and improve the planning and organization of this shipping will make it possible to achieve a total economic impact during the five years of more than 9 billion rubles, to free more than 400,000 workers, and to save a large amount of timber and metal.

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